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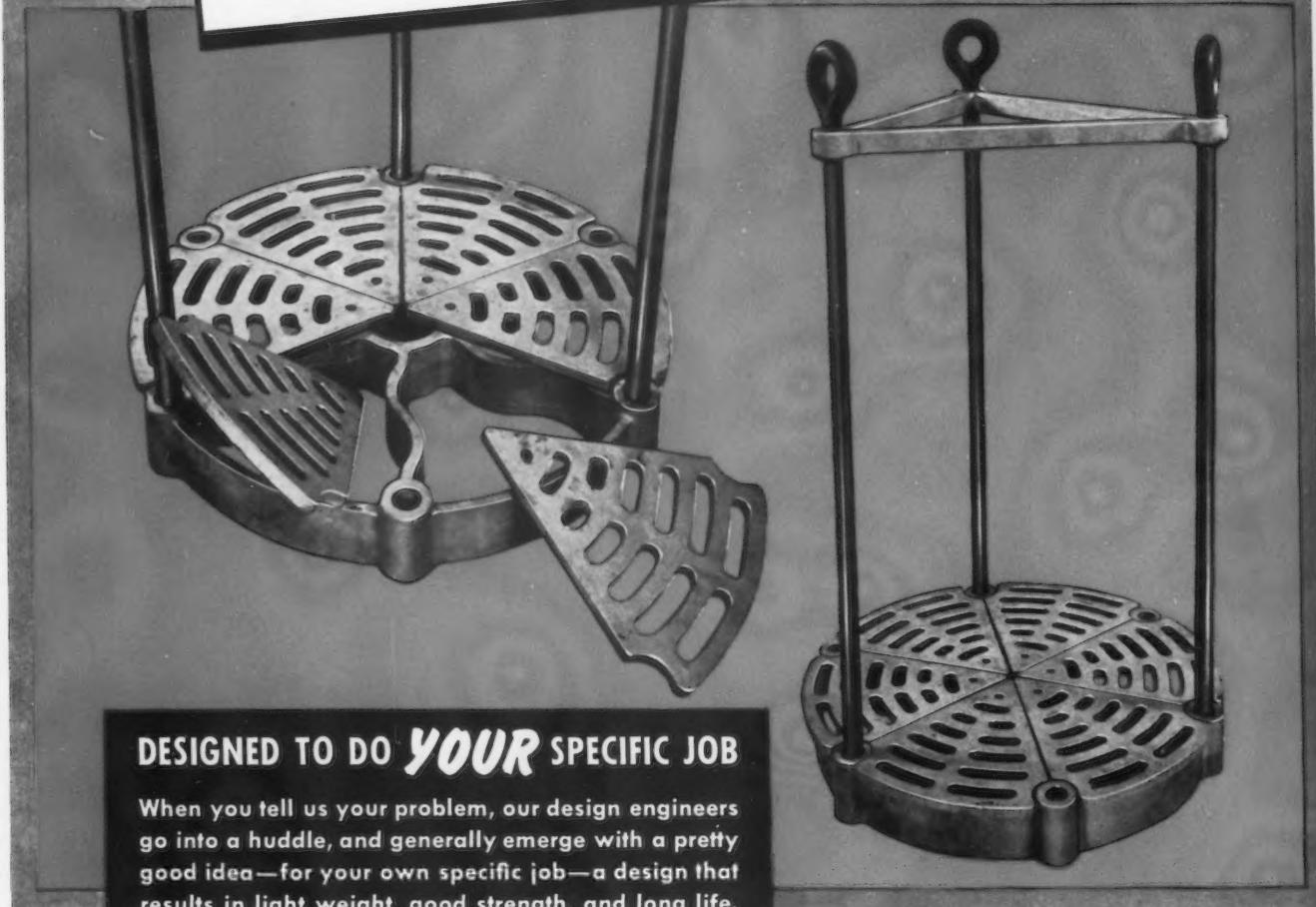
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DECEMBER 3, 1942

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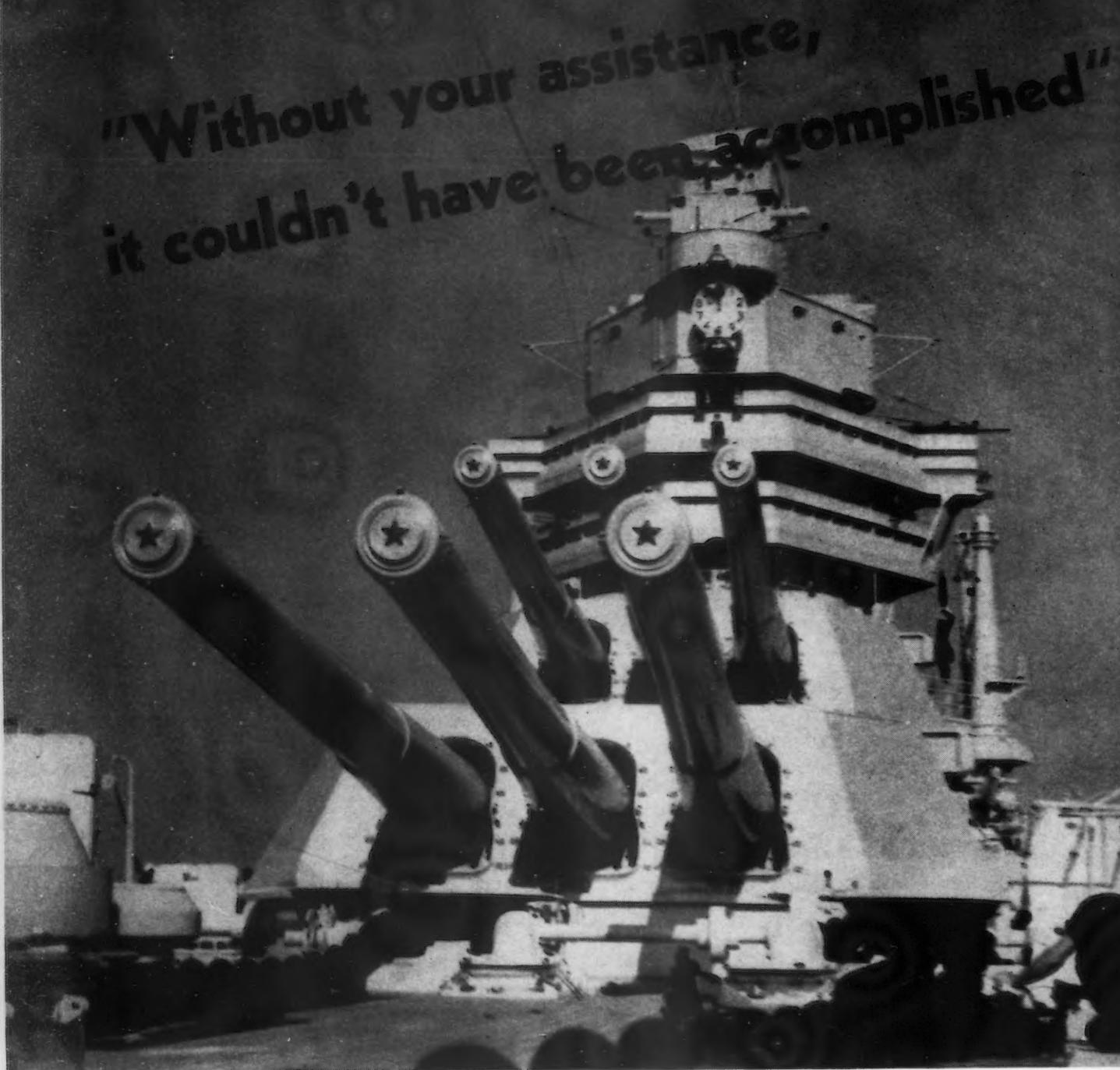
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Record-breaking service on an important Navy order, made possible by Ryerson co-operation on steel! "Without your assistance, it could not have been accomplished," writes the contractor—and again Ryerson teamwork scores.

Cases like this—in which quick Ryerson steel-service has speeded up war production—run into the thousands! While we have not kept count, enough Ryerson customers are working on war contracts to firmly establish Ryerson steel from stock as a vital part of the war production machine.

Hundreds of plants on war contracts are depending on Ryerson for steel. An impor-

tant order here, too urgent to wait on mill production; a few bars there; some strip or a few sheets somewhere else. It multiplies into tremendous tonnage—all labeled "RUSH"—and it's all going into tanks, planes, guns and ships to beat the Axis!

It is a source of pride to the Ryerson organization that its One Hundredth Year finds it on the direct line of greatest service in the war production program—There is a great deal of satisfaction in a War Production Unit report: "Without your assistance it could not have been accomplished."

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RYERSON STEEL-SERVICE

THE IRON AGE

DECEMBER 3, 1942

ESTABLISHED 1855



Design for Living . . .

THE changeover of industry from peace to war products has made some equipment temporarily unusable. So the question arises as to whether to sell it to somebody who can use it; to scrap it and thereby help keep our steel mills going or to hold it for the long pull.

WPB's advice to industry is to sell or scrap equipment which has been idle for 90 days and which has no prospect of employment within a similar period. Of course this policy has to be applied with discretion. If it were followed literally, we would come out of the war with plants and equipment that were adapted only to war products.

If I were to suggest an interpretation of policy, I would say: "Scrap or sell that idle equipment if you believe that it can be replaced later by something better."

All of us will be able to use "something better" after the war. Many of us will need "something better" to enable us to survive competition when that stranger returns again. But the natural reluctance which one has to discard that which may again be usable may stand in the way of that survival.

Sometimes it pays to be adventurous and to burn your bridges behind you as did the general who was determined to win the battle and thus made retreat impossible.

After the war you are going to need the finest and fastest equipment that can be had. Competition is going to make it necessary for you to have it. And equipment builders will make it possible for you to get it.

If I were a builder of equipment and especially of that kind of equipment that may be standing idle because it is not adapted to war products, I would redesign my product or products. I would want to have something better, something faster to offer the trade when the war is over. And knowing that I had that, I would go to the trade and say: "Do not hesitate to scrap that equipment of our make that is now standing idle in your plant. When you are ready to go back to your normal product once more we will have something better for you."

So the design for living after the war and for working after the war calls for redesign to make things lighter or faster or better or cheaper—yes and newer. Americans are not going to tolerate outmoded products after we and our allies have obsoleted Hitler and Hirohito. And the surest way to outmode a product is to produce a better one.

J.W. Van Beuren



Progress meeting of Chicago Area Industrial Scrap Drive: (left to right), John R. Johnston, chairman of the accounts allocation committee; Max Witz, technical advisor of the industrial salvage section of the WPB; L. C. Reed, chairman of the Chicago district steel mens' committee; and Harvey T. Hill, regional chief of the industrial salvage section of the WPB.

Steel Salesmen Join Force To Move Potential Industrial Scrap

The sales forces of Inland and other steel companies have formed an army of 2,700 men, who are working with the WPB Conservation Division to release potential scrap from 70,000 industrial plants throughout the country. Every steel salesman and serviceman has been assigned to cooperate with certain companies for the duration. In most territories the first calls have been made, salvage directors appointed, and scrap surveys are in progress or have been completed.

These men work with plant management to help find potential scrap not reached by normal "good house-keeping" methods. They are prepared to offer technical and market advice. With this help and cooperation, management is moving out tons of material—tons of

potential scrap—obsolete machinery, equipment, tools—surplus or frozen inventory—out-moded products—everything made of metal that is not actually needed.

And that is only one of the many intensive efforts on the part of the steel companies to keep scrap coming in for top production. The steel industry has contributed \$1,500,000 of a \$1,900,000 advertising and publicity campaign to inform the public of this great need. In addition, a major portion of each steel company's advertising also has been devoted to the cause.

The field expert who visits your plant can help you—and you can help America by moving your potential scrap *now*, when it is needed most for more ships, tanks and guns to equip our fighting forces.

*Dedicated
to Victory*

INLAND STEEL CO.

Smelting

Iron Ores

Electrically

By HERMAN COWES

Metallurgist, Det norske Aktieselskab for
Elektrokemisk Industri.
Oslo (Norway)

... Despite the fact that present plans for expansion of the steel industry on the West Coast call for standard blast furnaces, interest in electric furnace smelting has been growing considerably over the past few years. This article, describing European practice, fills a void in present-day literature on the subject of electric smelting.

CONDITIONS in America have not been favorable for the development of electric iron smelting. Blast furnace smelting has long been the established practice in eastern United States where large reserves of iron ore from the Lake Superior iron ranges, and the excellent Pennsylvania and West Virginia coking coals have furnished a satisfactory basis for the nation's tremendously important iron industry.

No other country in the world is as fortunate as the United States in its possession of this priceless combination, and nowhere else in the world has a steel industry developed to a comparable size.

With such favorable conditions for blast furnace smelting, it is not surprising that the electric smelting process has not gained a foothold, especially as the cost of electric energy has been much too high to replace the cheap heat energy of blast furnace coke.

The relatively small sized electric furnace with its higher unit operation costs could not compete with the large capacity blast furnace and its comparatively lower operating costs in an industry where large output was needed. Therefore no incentive has existed to develop electric smelting.

However, on the Pacific Coast conditions* are not so favorable for the blast furnace. The coals suited for metallurgical coke, al-

though available, are not as plentiful as in the East, and the ores

occur in smaller, more scattered deposits. The market for steel is likewise smaller and the scale of production must therefore, be correspondingly reduced.

Fortunately, though, electric power from Western rivers is abundant and cheap, and in this respect the Western situation is more comparable with other countries such as the Scandinavian countries, Italy, etc., where electric furnace iron smelting has developed. The problem of suitable coking coals is not an obstacle, as the electric furnace operation is not dependent upon the physical strength of the coke, and there is available in the Pacific Northwest adequate reserves of lower ranking coals, and a plentiful supply of wood waste from the sawmills and the forests to supply reducing carbon for electric smelting.

Development of federal power projects on the Columbia River has stimulated the interest of Western metallurgists in electric smelting, and the writer has been engaged for some months in studying the possibility of using the Spigerverk or Tysland-Hole electric pig iron furnace under Pacific Coast Conditions. This furnace has had much success in recent years in Norway, Sweden, Finland, Italy and Japan,

and it is hoped that one or more furnaces will be built in the Pacific Northwest in the near future.

Development of Electric Smelting

When reducing iron ore in an electric furnace, the heat necessary to maintain the smelting temperature is supplied by the electric power, with carbon needed only to effect reduction of the ore and carbonization of the iron. Heat by electric power thus replaces the amount of heat developed by coke combustion in the ordinary blast furnace.

Although the electric pig iron furnace has been under development since the beginning of the 20th century, the art of electric iron smelting, however, has developed much more slowly than other electro-thermic processes. One of the main reasons for this has been the absence of a suitable furnace. Electric smelting requires a closed type furnace, and one not dependent on charcoal or any specific reduction material. While the Swedish shaft furnace uses charcoal and has been successfully operating for many years, the first furnace that has been adapted to the use of coke and proven successful under commercial operating conditions is the Spigerverk furnace. This fur-

*Also on this subject is the article "Pacific Coast Steel Industry," by T. W. Lippert in THE IRON AGE of March 21, 1940, p. 25.

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nace first went into operation at Oslo, Norway, in 1928, and with improvements in design made by Ivar Hole, and Georg Tysland, it has become the most successful commercial electric smelting furnace for the varied ore and fuel conditions met.

Early Furnace Designs

In the beginning, open top furnaces customarily employed in the production of ferro-alloys were used but these were abandoned at an early stage. A closed top furnace was adopted to recover and utilize the valuable top gases, and permit construction of larger furnace units.

More than 40 years have now passed since Stassano, an Italian metallurgist, was granted his first patent on an electric furnace for the reduction of iron oxide. Among other pioneers must be particularly mentioned, Paul L. T. Heroult, who built electric pig iron furnaces in France and Canada, and at a plant on the Pitt River at Heroult, Cal. All of these early furnaces used charcoal. Electric pig iron smelting using coke was demonstrated probably for the first time in 1904 by Keller at Livet, France, in a 600-kw. open top furnace. This furnace had two smelting hearths, each provided with one electrode, and connected through a channel or sump from which the iron was tapped.

The first closed furnace was built for the Noble Electric Steel Co. in 1907 in California by Paul Heroult with a capacity of 1500-kw. In 1909 this was followed by another furnace of the same capacity, designed by Prof. Dorsay A. Lyon. As none of these furnaces proved a success, the company partly modified the Heroult furnace. One 2000-kw. furnace of this type was built in 1911 and one 3000-kw. furnace was put up in 1912. These furnaces were charged with coke, but it proved necessary to use a minimum of 40 per cent charcoal. The furnaces were provided with shafts for supply of the charge and the electrodes were suspended through arches arranged between the shafts. The operation was abandoned in 1914.

In 1907 and 1908, three Swedish engineers, Grönwall, Lindblad and Stalhane, developed the Elektrometall shaft furnace (See Fig. 1) at the Domnarfvets Järnverk, Sweden. Further development was carried on at Tröllhattan in 1910 and this furnace proved of great

importance to the iron industry in Sweden. It was built for capacities up to 5000-kw. In 1920 12 furnaces of the Elektrometall type were in operation in Sweden. But since then the number has decreased, and in 1936 only six furnaces were in operation. Furnaces of the Elektrometall type were built also in Norway (Hardanger), in Italy and Japan, but were later abandoned.

section through the furnace, showing the enlarged crucible and the superimposed shaft. Formerly the shaft was shaped very much like that of the blast furnace with a narrow bosh above the crucible, but in the later design the walls were made cylindrically to facilitate descent of the charge into the crucible. The electrodes are suspended through the crucible arch into the charge resting on the hearth.

The volume of furnace gas generated in electric smelting is about one-sixth of that obtained by ordinary blast furnace smelting, and thus very little heating of the charge results in the shaft. As a result, there is little or no reduction by the carbon monoxide ascending through the charge. To get the advantage of more heat transfer from the hot zone in the crucible to the descending charge in the shaft, and also to effect a partial reduction with the ascending CO, the Elektrometall furnace was provided with an arrangement for recirculation of part of the furnace top gases, which were returned to the furnace below the arch of the hearth. By so doing, the arch was effectively cooled and its life was considerably lengthened, while the thermal efficiency of the furnace was improved by the preheating and the partial reduction in the shaft. This resulted in savings in both power consumption and reducing carbon, as well as in the protection of the crucible arch.

Norwegian Smelting Problems

In Norway, the iron requirement was mainly of the high silicon, foundry grade, and as very little charcoal was available, the Elektrometall furnace, which worked so well in Sweden, was found to be unsuited to the conditions there.

The Norwegian Tinfos furnace (Bie-Lorentsen) was used at Tinfos and Ulefos, Norway, during the period 1910-1922. This furnace used coke exclusively, and produced a high silicon pig iron. It was provided with shafts and was intended to utilize the top gases. This furnace was not successful. It was a single-phase furnace and large units could not be built. It did, however, represent pioneer work in the coke smelting field.

Dr. Helfenstein, who is known for his construction of large ferro-alloy furnaces, built a 7000-kw. furnace in 1913 at Domnarfvet, Sweden, for production of electric pig iron with coke. This furnace, however, proved unfit for the purpose.

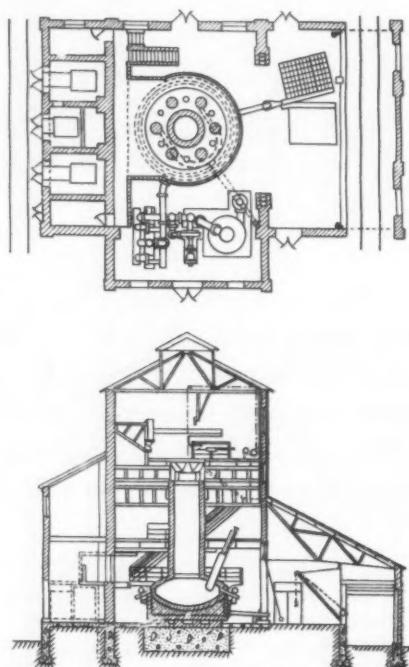


FIG. 1—Sectional views through Elektrometall furnace. Top view shows a section through the furnace shaft with the furnace transformers transmitting current to the six electrodes on the left. The lower sketch is of a vertical section through the furnace, illustrating the enlarged crucible and superimposed shaft.

• • •

The Elektrometall furnace was designed to make use of charcoal, although it has been possible to use up to 30 per cent of coke breeze mixed with the charcoal. The large volume of the crucible, and the shape of the smelting hearth made it difficult to produce a high silicon iron as it was not possible to control the temperature of iron and slag. However, all qualities of steel-making pig iron could be made.

The top view of Fig. 1 shows a section through the furnace shaft with the furnace transformers transmitting current to the six electrodes on the left. In practice, up to eight electrodes are used with Scott connection. The molds for casting the pig iron, and the gas cleaning plant are shown on the right. The lower view is a vertical

In the years just before and during the first World War, experiments were made in Norway for the production of electric pig iron at Salteroëd, and pig iron was produced from Norwegian ores at Arendal Smelteverk.

Electric pig iron has been produced in Norway since 1928 by Norsk Aluminum Co. at Hoyanger after the method of Prof. Pedersen as a by-product of the electric manufacturing of calcium aluminate in open furnaces.

During the period 1917 to 1919, the Norwegian company, Det norske Aktieselskab for Elektrokemisk Industri, Oslo, Norway, through their engineers, Mr. Söderberg, Dr. M. Sem and Mr. Westly, developed a new electrode system with self-baking continuous electrodes, known as the Söderberg Electrode. This electrode system has become of great importance to the electric smelting industry throughout the world, and consequently has made an important contribution towards the successful solution of the electric pig iron problem.

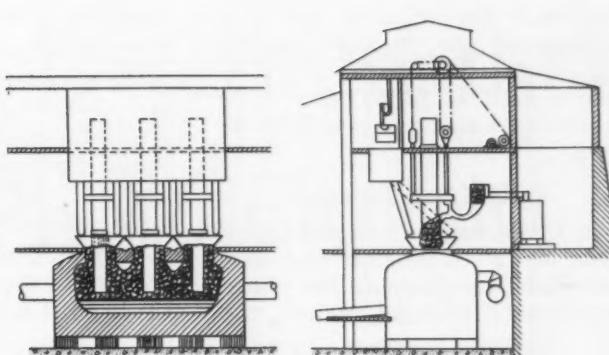
The development of electric pig iron smelting in Norway has, of course, been followed with great interest. The solution of its pig iron problem—whether by means of electric furnaces or by coke blast furnaces—has been of vital interest to the Norwegian Government which has not only assisted with money and guarantees, but has also carried on actual experimental work.

At the suggestion of the Norwegian Government, Georg Tysland, in cooperation with Det norske Aktieselskab for Elektrokemisk Industri, in 1921 designed an open furnace of 500-kw. capacity, in which coke was used. See Fig. 2. Later, the furnace was closed by an arch and operation was continued for 16 months. Norwegian iron ores and concentrates were used.

The results of the experiments seemed promising, and with the Söderberg electrode system, also designed by the cooperating company, a three-phase furnace of 6000 kw. was erected and put in operation in July, 1925.

The Tysland furnace was provided with three electrodes suspended vertically into the furnace. The furnace was of the closed type, and the ore was charged around the electrode, the top gases being sucked out through the walls. The

FIG. 2.—The Tysland design was a three-phase, closed type furnace of 6000 kw., with three vertically suspended electrodes around which the ore was charged.



reduction material consisted of a mixture of coke-breeze and coke.

During the early operation of this furnace, the conductivity of the charge was usually too high. This resulted in too large a gap between the electrodes in the furnace, thus causing a high power consumption. In addition, the gas could not be satisfactorily removed and utilized as most of it escaped around the electrodes.

Before commenting further on this furnace, it would be of advantage to mention several important factors, particularly those with respect to the use of coke as reduction material, which had to be considered in the construction of the Tysland furnace. These are:

(1) The greater density of the charge as contrasted with charge containing charcoal. This caused a heavier pressure on the electrodes and, combined with the greater electric conductivity of coke, made control of the electric conditions in the furnace difficult.

(2) Tendency of the charge to clinker, as coke usually yields a more fusible slag. Once clinkered, the charge was more difficult to break up because of the greater strength of a coke charge.

(3) A greater tendency toward formation of graphite in the furnace.

In all electric smelting the quantity of reducing carbon in the charge must be carefully balanced in relation to the quantity of the oxides to be reduced, irrespective of the nature of the carbon. If there is excess of carbon in the furnace, it tends to accumulate and causes operating difficulties. In using coke, this tendency is more pronounced than it is when using a reduction material like charcoal.

These three factors made it difficult to design a closed furnace type for smelting with coke. It was difficult to find a satisfactory position of the electrodes in the furnace and to provide for their smooth adjustment. The earlier furnaces oper-

CHARACTERISTIC	REPRESENTING	TYPE OF FURNACE
Electrodes arranged around central charge, supply	Slassano (1900) Elektrometall (1908)	 Elektrometall
Charge supplied around the electrodes	Helfenstein (1913) Tysland (1925)	 Tysland
Charge supplied in a distance from the electrodes	Héroult (1906) Noble (1911) Tinflex (1910) T-H (1928)	 Tysland-Hole

ated with low voltages and as a consequence the furnace capacity was small. One furnace, for instance, used 40 to 45 volts while another furnace used up to 70 to 80 volts.

Tysland-Hole Furnace

In 1927, changes in designs were made by a Norwegian engineer, Ivar Hole, to eliminate the above mentioned disturbing factors, the

result being the so-called Tysland-Hole furnace, also called the Spikerwerk furnace, so named because the first furnace of this kind was started in the steel plant at Christiania, Spikerwerk, in Oslo, Norway.

Fig. 3 shows the different furnace profiles as classified in three groups. In the Spikerwerk furnace (Tysland-Hole), shown at the bot-

tom, the pressure of material against the electrodes is least for this type. All the furnaces can operate with a charge using charcoal but, as previously explained, not all of them work equally well with charge using coke.

Ed. Note: Next week, the author concludes this article with a description of the Tysland-Hole furnace and an evaluation of electric smelting as compared with the standard blast furnace process.

Oxygen Concentrations Linked with Acid Open Hearth Process

TWO German metallurgists have been responsible for some of the most searching experimental work on refining conditions in the acid open hearth process during the last five years. Their first reports, issued in 1937, dealt with the behavior of the oxygen content in normal melts during the boiling period and led to the conclusion that there was no definite relationship between the oxygen values and the rate of refining. On the other hand, the oxygen concentration appeared to be closely linked with the conditions governing the formation of bubbles of CO at the hearth bottom.

In further experiments, these men studied the effect of temperature on the oxygen content of the charge and variations in this concentration after finishing the charges and in pouring. The temperature effect was determined by means of oxygen samples taken during the refining of six charges. Five of these were run at a comparatively cold temperature and the other at a normal temperature. The furnaces were of about 10 to 12 tons capacity and the metal was charged at about 2 deg. C. Different quantities of ore were added to each charge and then left to boil undisturbed. Temperatures were measured in the spoon by means of an optical pyrometer and readings were not corrected. The results of the sampling are given in the accompanying table.

This table shows that oxygen concentration diminishes with rising temperature. This is accounted for by the fact that the formation of CO is more inert at lower temperatures due to the greater viscosity

of the steel and inadequate interaction between the hearth bottom and the charge. This reduced reactivity is also shown by the lower silicon reduction, which has been recorded in the table. Only when the slag layer covering the hearth at the start of melting becomes reduced can the bubbles of CO form at ex-

RESULTS OF SAMPLING

Charge (C.) (O.) $\cdot 10^3$	Tempera- ture Deg. F.	Reduced Si Content
B1	8.1	2550 0.00
A2	6.6	2640 0.02
B2	4.6	2640 0.03
A1	4.4	2650 0.04
A4	4.4	2680 to 2705 0.10
A3	3.8	2685 0.10 to 0.11

posed areas of the porous hearth. At the same time, silicon reduction becomes more pronounced.

To investigate conditions during deoxidation and pouring, eight further charges of a similar nature were studied in an 18-ton open hearth. Although the final C, rate of refining, and silicon reduction varied, the oxygen concentration was found barely to alter on adding the deoxidizing agents, Ferro-Mn and Ferro-Si. On tapping and when sampling in the ladle there was also no reduction in oxygen concentration as a result of deoxidation. One exception to this occurred in a charge of mild steel (0.18 deg. C) which after making the additions showed a pronounced fluctuation of values and a definite lessening of oxygen concentration. This is explained by the fact that oxygen

separates earlier with the mild steel charges because of the higher oxygen concentration of these steels, which is about three times greater than the next harder steels.

A metallographic examination of unskilled specimens from each heat showed that in the majority of cases the inclusions were only secondary silicate inclusions, such as could have formed only after crystallization of the iron had commenced. In these cases, the deoxidizing actions of Si and Mn actually only started as solidification started in the mold. No reduction of oxygen concentration could therefore be expected in this case. On the other hand, the mild steel charge, immediately after additions were made, showed coarse slag inclusions, which must obviously have already been formed in the liquid steel and hence had the opportunity to grow by taking up further material and rising inclusions. This accounts for the fluctuating oxygen values as no uniform distribution can be expected with coarse inclusions.

From these observations it is concluded that in steels giving no precipitated inclusions when additions are made in the furnace, it is immaterial in what form or sequence the additions of Ferro-Mn, Ferro-Si or Silico-Mn are made. As a result, the oxidation of the harder steels during pouring cannot lead to an increase in the content of inclusions, for in these steels the C still reacts with atmospheric oxygen during pouring. Only in steels in which Si and Mn have already commenced to react with the oxygen dissolved in the steel, is there also a reaction with the air.

Cobalt Determination by Photo-Electric Comparison

By WALTER W. CLARKE
Chief Chemist, Latrobe Electric Steel Co.

THE determination of cobalt in steel, while not difficult in the hands of an experienced operator, has often caused a lot of trouble to one not familiar with this element.

The Alpha-Nitroso-Beta-Naphthol method, probably used more than any other, is long and tedious, and also, at times unreliable, owing to the poor quality of the Alpha-Nitroso-Beta-Naphthol available at present. One must be constantly alert for impurities and run standards and blanks in order to obtain a moderately accurate result.

The electrolytic method on most steels is also long; and, like the titration method with silver nitrate and potassium cyanide, if nickel is present, this element must be determined separately and the percentage deducted to get a fairly accurate result.

In the color method, nickel does not interfere. Twenty per cent of nickel added to a sample of Cobalt Magnet steel gave results which check with the percentages obtained by several of the other longer methods as follows:

No. of Sample	Weight of Steel Taken, in Grams	Ni added per cent	Dial Reading
1	0.5	20	64.5
2	0.5	20	64.6
3	0.5	20	33.2

The above results show the accuracy of the method. By other reliable analyses, the steel used had been previously standardized as 39.06 per cent Co; so, even with the multiplication of the error, the results are good. In the case of No. 1 (the chart used at Latrobe being based on a 2-gram sample), the per cent Co obtained, namely 9.67 per cent, must be multiplied by 4, giving 38.68 per cent Co. Since No. 2 is also $\frac{1}{4}$ the base weight,

... Accurate results in determining Co content in steel, even in the presence of such elements as W, Cr, V, Ni, Mn and Mo, is one of the advantages of the color method described herein.

it too is multiplied by 4 or 38.80 per cent Co. Sample No. 3 was $\frac{1}{4}$ of the base weight and when multiplied out gives 39.30 per cent Co.

Taking No. 1 as a 9.77 per cent standard, the error is 0.10 per cent low; with No. 2 as a 9.77 per cent standard, the error is 0.07 per cent low, and with No. 3 as a 3.91 standard, the error is 0.02 per cent high.

Tungsten, chrome, vanadium, nickel, manganese and molybdenum do not interfere. The procedure is as follows:

Two grams of steel (depending on the amount of cobalt present) are weighed and placed in a 500 cc. Erlenmeyer flask, and dissolved in 50 cc. of hydrochloric acid (1:1). When in solution, nitric acid is added by drops until oxidized and then boiled down until tungstic acid is a yellow color. The solution

dry funnel and dry folded filter paper is used to filter into a dry flask or beaker. Twenty-five cc. are drawn off in a pipette previously cleaned and into which a portion of the solution has been drawn, shaken and discarded. The measured 25 cc. are run into a clean, dry 100 cc. volumetric flask. Five cc. of a 15 per cent solution of stannous chloride dissolved in concentrated hydrochloric acid is added then cold (room temperature) concentrated hydrochloric acid is poured in to make up the mark. The solution is then transferred to a small dry beaker and mixed well. The cell of the Fisher Electrophotometer (the machine used at Latrobe) is filled and compared. A chart, of course, must be made using different percentages of cobalt in order to get the curve. Percentages of cobalt are read directly on the chart.

If, after the steel is dissolved and oxidized, carbides should be present which will not break up in the hydrochloric acid after oxidizing, 25 to 30 cc. of perchloric acid are added and taken down to fumes. The method as outlined in the beginning should be followed plus the addition of hydrochloric acid (1:1), boiling, taking off hot plate, adding water, cooling, etc.

On low cobalts, a 4-gram sample is used and the chart readings divided by 2. Latrobe chart readings go to 10 per cent cobalt, which is based on a 2-gram sample. On very high cobalts, from 10 per cent to 40 per cent, a 0.5 gram sample should be used and chart readings multiplied by 4.

is boiled to about 25 cc., 50 cc. more HCl is added, and again boiled low to about 25 cc. After it has cooled, 100 cc. of distilled water are added. The solution is transferred to a 500 cc. volumetric flask and freshly made zinc oxide emulsion is added until all iron, etc., is precipitated and the zinc oxide is in slight excess. Distilled water is added to reach the mark and it is then returned to the original Erlenmeyer flask, being mixed well. A

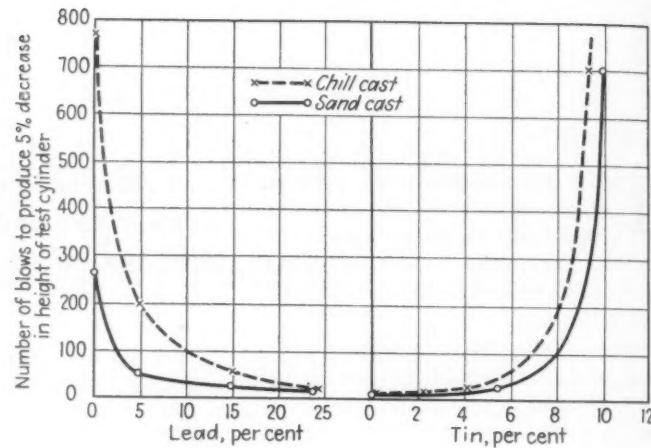
Low-Tin and Tin-Free

MERGENCY specifications will shortly be introduced in England for certain low-tin content gunmetals and cast brasses. The action is being taken to conserve virgin metal particularly tin, and to enable full use to be made of available supplies of gunmetal and brass scrap. This latter consideration is important because tin-free silicon bronzes like P.M.G. metal cannot be contaminated with tin-bearing scrap.

P.M.G. metal, which derives its name from the bronzes it is intended to replace (phosphor bronze, manganese bronze and gunmetal), is available in this country under license from Phelps Dodge Copper Products Corp. It is supplied to foundrymen in the form of a hardener in small ingot form. An article on its applications and properties appeared in THE IRON AGE, July 16, 1942, pages 54 and 55. Another tin-free bronze with excellent

FIG. 1—The effect of lead and tin on the resistance of bronze to pounding at room temperature.

By French, Rosenberg, Harbaugh and Cross.



physical properties is "Navy" Tombasil, a product of Ajax Metal Co., which was described in THE IRON AGE, July 30, 1942, pages 54 to 59. Other silicon and low-tin bronzes are marketed in this country under the trade names Everdur, Cusiloy A, Herculoy, Olympic, Doler-brass, Duronze, Vulcan and Phono bronze.

Despite the availability of tin-free silicon bronzes, there are reasons, as indicated above, for the presentation of data on sand cast low-tin gunmetals and brasses. At the 39th annual conference of the Institute of British Foundrymen a paper on the properties of sand-cast low-tin content gunmetals and

TABLE I
Mechanical Properties of Low Tin Content Gunmetals and Cast Brasses in Comparison with 88-10-2 Gunmetal

Composition, Per Cent	Gunmetal				Cast Brass			
	88-10-2 Sn 9.5—10.5 Zn 1.5—2.5 Pb 0.50 max. Ni 1.00 max. Imp. 0.15 max. Cu balance	88-8-4 Sn 7.5—8.5 Zn 3.5—4.5 Pb 0.50 max. Ni 1.00 max. Imp. 0.15 max. Cu balance	86-7-5-2 Sn 6.0—8.0 Zn 4.0—6.0 Pb 1.0—3.0 Ni 1.00 max. Imp. 0.50 max. Cu balance	85-5-5-5 Sn 4.0—6.0 Zn 4.0—6.0 Pb 4.0—6.0 Ni 1.00 max. Imp. 0.50 max. Cu balance	Type A Sn 2.00 max. Zn balance Pb 1.0—4.0 Ni 1.00 max. Fe 0.75 max. Al 0.01 max. Imp. 0.50 max. Cu 70.0—80.0	Type B Sn 2.00 max. Zn balance Pb 1.0—4.0 Ni 1.00 max. Fe 0.75 max. Al 0.25 max. Imp. 0.50 max. Cu 62.0—70.0		
Yield point, lb. per sq. in.....	18,000—22,500	18,000—22,500	15,700—20,000	13,500—18,000	9,000—13,500	11,000—16,000		
Ultimate strength, lb. per sq. in.....	36,000—45,000	36,000—45,000	31,000—40,000	27,000—36,000	25,000—34,000	31,000—40,000		
Elongation, per cent in 2 in.....	10—30	10—30	12—30	15—35	20—40	15—35		
Izod impact, ft.-lb.....	7—17	7—17	7—17	6—12	10—20	—		
Brinell hardness.....	65—80	65—80	60—70	55—65	40—60	45—65		
Diamond pyramid* hardness.....	70—100	70—100	70—80	60—70	—	—		
Compressive strength, lb. per sq. in., 0.001-in. defl.....	13,500—18,000	11,000—18,000	11,000—13,500	9,000—11,000	6,700—9,000	7,800—10,000		
Modulus of elasticity (lb. by 10^6).....	12—14	12—14	12—14	11—13	11—14	12—14		

*Diamond hardness readings on cast material are likely to be variable and this method is therefore not recommended for control purposes.

Bronzes and Brasses

brasses was given by F. Hudson, and it is abstracted here.

Before commenting on the properties of the alloys covered by the new British emergency specifications it must be admitted that it is not possible to eliminate entirely the higher tin content alloys from engineering applications. For certain special purposes their use appears to be essential. It has been shown, for instance, that in unlined bearings subject to impact, such as those on freight cars and in ship's rudder bushings, the resistance to deformation is markedly reduced as the tin content falls below 10 per cent and with the introduction of lead.

It is interesting to note that the presence of up to 4 per cent zinc has, in most instances, but little effect upon the frictional properties and resistance to deformation.² The use of gunmetal or bronze containing about 10 per cent tin is also considered essential for high pressure air and hydraulic valves operating at 1000 to 4000 lb. per sq. in. Alloys containing up to as much as 12.5 per cent tin have been unnecessarily specified for these lat-

... Many engineers and foundrymen are not too well acquainted with these alloys, but the tin scarcity makes a knowledge of their properties a practical necessity. This first section of a two-part article reviews physical properties with particular emphasis on the low-tin bronzes.

○ ○ ○

ter applications in the past; the higher tin content making the production of sound castings more difficult in the foundry.

On the other hand, gunmetal of the 88-10-2 type is being wastefully employed and service conditions can be equally well met by the use of lower tin content alloys, or even by cast brass. The following comparison of properties has been specifically compiled to offer guidance in this direction.

Low-Tin Gunmetals

Three alloys are included in the low-tin gunmetal group:

88 per cent copper, 8 per cent tin, 4 per cent zinc.

86 per cent copper, 7 per cent tin, 5 per cent zinc, 2 per cent lead.

85 per cent copper, 5 per cent tin, 5 per cent zinc, 5 per cent lead.

Mechanical Properties (Room and elevated temperature): Table I shows a comparison of mechanical properties at room temperature of the three gunmetals under consideration against Admiralty gunmetal. Table II gives the mechanical properties principally based on short-time tensile tests, at elevated temperature. Considerable work has been done by Spring,³ of the Crane Co., on cast materials for high-temperature service, which shows that, while short-time tensile

TABLE II
Mechanical Properties of Gunmetal at Elevated Temperatures

Temperature	Alloy A (88-10-2)				Alloy B (86-7-5)				Alloy C (85-5-5)				Admiralty Gunmetal				
	Deg. F	Deg. C	Yield Point, Lb. Per Sq. In.	Ultimate Strength, Lb. Per Sq. In.	Elongation, Per Cent	Elastic Limit, Lb. Per Sq. In.	Ultimate Strength, Lb. Per Sq. In.	Elongation, Per Cent	Yield Point, Lb. Per Sq. In.	Ultimate Strength, Lb. Per Sq. In.	Elongation, Per Cent	Yield Point, Lb. Per Sq. In.	Ultimate Strength, Lb. Per Sq. In.	Elongation, Per Cent	Charpy Impact, Ft.-Lb.		
70	20	19,900	40,300	15.0	25,500	34,000	8.0	18,600	34,000	14.0	16,600	38,100	36.5	15,900	34,000	20.5	
200	93											15,000	37,200	37.5	16,400	39,200	31.2
300	150					22,000	36,100	8.6				14,300	35,400	31.0		37,400	27.2
400	205								16,800	33,600	18.0	15,000	34,000	28.5		37,600	28.7
500	260		18,400	32,300	5.5				13,200	26,400	11.5	13,000	29,100	24.5		35,600	25.5
555	288														14,100	37,700	19.5
600	316		16,800	33,600	9.5	18,400	21,300	3.7	20,200	7.0	13,000	16,400	2.5	12,500	29,600	15.7	
700	370		16,800	28,400	9.5				15,000	4.0	13,400	13,400	1.0	12,300	15,200	1.5	
800	427		15,000	22,600	3.5				9,850	2.0	8,960	8,960	0	11,900	14,300	2.0	
900	482								7,400	7,400							

*Extracted from A.S.M.E.-A.S.T.M. Symposium on Effect of Temperature on the Properties of Metals, 1931.

†Extracted from Compilation of High-Temperature Creep Characteristics, A.S.M.E.-A.S.T.M., 1938.

‡Courtesy of J. Arnott (G. & J. Weir, Ltd.).

tests indicate that the higher tin content alloys of the 86-12-2 and 88-10-2 types are stronger than 86-7-5-2 gunmetal at elevated temperature, the latter alloy is actually more creep resistant than the former at temperatures above 482 deg. F. Spring gives the data in Table III for creep resistance considered from the approximate limiting standpoint.

W. C. Stewart⁴ published the following figures on creep properties:

Gunmetal	Deg. F.	Stress, Lb. Per Sq. In., to Produce a Creep Rate of	
		0.01 Per Cent Per 1000 Hr.	0.1 Per Cent Per 1000 Hr.
88-10-2	400	11,200	15,680
	500	6,050	8,960
	600	2,910	4,480
90-6-2-2	400	8,960	13,440
	500	6,050	8,960
	600	3,140	4,030

It is interesting to note that the decreased tin and increased lead contents do not appear to affect creep properties appreciably. Further creep tests have been carried out on Admiralty gunmetal and 86-7-5-2 gunmetal by Bolton.⁵ The alloys tested had the following composition and room temperature properties:

	Admiralty Gunmetal A.S.T.M. Spec. B.60.	Bronze A.S.T.M. Spec. B.61.
Copper	87.6	87.14
Tin	10.18	6.22
Zinc	2.2	4.61
Lead	nil	1.83
Phosphorus	trace	trace
Ultimate strength, lb. per sq. in.	49,060	37,860
Elongation, per cent	35.4	34.3

Creep tests were carried out on the above alloys at temperatures of 500, 550 and 599 deg. F. after being held in the creep test for periods ranging from 700 to 1700 hr. The specimens were also tested in tension at room temperature to determine whether long exposure at the temperature of creep testing had produced embrittlement. It was found that the 86-7-5-2 gunmetal was well suited for use up to 550 deg. F. but not for higher temperatures. Its limiting creep strength, based on the stress required to produce a rate of flow less than 0.1 per cent in 10,000 hr. (0.00024 in. per day) after the first 500 hr. of creep tests and running up to 2100 hr. duration, is about 8000 lb. per sq. in. at 500 deg. F., and a design stress of 5000 lb. per sq. in. is recommended at this temperature.

At 500 deg. F. the load carrying



PUMP runner of P.M.G. metal, a tin-free silicon bronze. This 2830-lb. casting shows that intricate castings can be produced in this alloy if the proper foundry technique is employed.

Photographs by Cramp Brass & Iron Foundries Division, Baldwin Locomotive Works.

ability of Admiralty gunmetal was lower than that of 86-7-5-2, and there was definite evidence of embrittlement. Bolton recommends that Admiralty gunmetal should not be used above 450 deg. F. and suggests a design stress of 5000 lb. at that temperature.

Quite recently the A.S.M.E. has indicated allowable design stresses for 86-7-5-2 and 85-5-5-5 gunmetal in its rules for construction of unfired pressure vessels. (See Table IV).

Bronze valves and fittings cast in 86-7-5-2 gunmetal can be employed up to 500 deg. F., while if made in 85-5-5 material the maximum temperature for use is limited to 400 deg. F.

Sub-Zero Properties

Castings show a curious difference in behavior from wrought materials at low temperatures, for while the strength is increased along similar lines to that which occurs in wrought materials, the ductility is always slightly less than that indicated at room temperature. Strauss⁷ gives the following data in connection with 88-8-4 gunmetal:

Temperature, Deg. F.	Yield Point, Lb. Per Sq. In.	Ultimate Strength, Lb. Per Sq. In.	Elongation, Per Cent in 2 In.	Reduction in Area, Per Cent
68 -292	18,600 30,460	40,000 45,250	31.3 15.3	38.7 24.6

It can be assumed that changes of similar magnitude will occur in

the other gunmetals under review. The alteration in properties with decreasing temperature may be generalized as follows: There is an increase in yield point, tensile strength, hardness, endurance limit, modulus of elasticity, and compressive strength; and a decrease in elongation, reduction of area, and impact resistance.

Typical values for such properties as specific gravity, coefficient of expansion, thermal conductivity, etc., are given in Table V. So far as the gunmetals are concerned there is little difference in physical properties between 88-10-2 and other types under review.

Corrosion Data

The increased lead and zinc contents within the range of compositions covered do not appear to have much effect on the corrosion resistance of gunmetal by normal sea and fresh water. Laboratory tests show 88-10-2 to exhibit a loss in weight of 0.288 per cent after

TABLE III
Effect of Temperature on Creep

Material	Approximate Temperature Permitting Creep of		
	1 Per Cent in 10,000 hr. at 25,000 lb. Per Sq. In.	1 Per Cent in 10,000 hr. at 1,000 lb. Per Sq. In.	Range
Cast red brass (5.63 Sn, 6.26 Zn, 2.71 Pb, balance Cu.)	400	800	433
Cast bronze (11.98 Sn, 1.36 Zn, 0.16 Pb, balance Cu.)	450	750	333

eight weeks' immersion in sea water. Gunmetal containing 7.0 per cent tin, 3.75 per cent zinc, 3.75 per cent lead, and the balance copper, showed a loss of 0.26 per cent under similar conditions. Practical observations on equipment in service, such as valves, tend to confirm these findings. Table VI outlines further corrosion tests conducted on gunmetal and bronze in fresh and sea water.

It is interesting to observe that, while an increase of temperature accelerates the corrosion of gunmetal and bronze in fresh water, the effect of hot sea water appar-

ently reduces the rate of attack over that experienced in cold sea

water, although the degree of attack is appreciably greater than that experienced in fresh water. Care should be taken in using gunmetals for handling softened boiler feed water to keep the zinc content as low as possible.

Production Data

Gunmetals of the 88-8-4, 86-7-5-2 and 85-5-5-5 types are no more difficult to handle in the foundry than Admiralty gunmetal. As a matter of fact, both 86-7-5-2 and 85-5-5-5 possess superior castability and are particularly adaptable to the production of pressure castings in large numbers. Similar pouring temperatures to those employed for 88-10-2 (2120 deg. to 2156 deg. F. for test bars) give perfectly satisfactory results with the other alloys under review, as these test results made from sand castings produced by the Phosphor Bronze Co.:

Alloy	Yield Point, Lb. Per Sq. In.	Ultimate Strength, Lb. Per Sq. In.	Elongation, Per Cent in 2 In.
88-8-4	21,000	43,900	37.0
86-7-5-2	20,400	38,975	39.0
85-5-5-5	20,200	34,050	29.0

The 88-8-4 alloy was poured at



OWING to its uniformity of grain structure and high physical properties, P.M.G. metal is often specified for castings like this 10,000-lb. evaporator section.

2138 deg. F., the other two at 2120 deg. F. The Brinell hardness readings were 78, 67 and 61 respectively. Yield points were taken by dividers.

Patternmakers' shrinkage for all the alloys is approximately 3/16 in. per ft. It should be noted that

there is little danger of lead segregation in castings containing up to 6 per cent lead, where average sections are involved. This point will have to be watched in heavier sections, however, particularly in using 85-5-5-5.

The machinability of 88-8-4 gunmetal is similar to Admiralty while 86-7-5-2 and 85-5-5-5 will tend to be slightly better. All these alloys can be soldered and brazing by the usual methods should be quite successful.

Welding is difficult on gunmetal due to the extreme heat fragility of the alloy and the production of zinc fumes. Satisfactory results are most likely to be obtained by arc welding with phosphor bronze electrodes in conjunction with pre-heating. With standard electrodes of this type 88-10-2 and 88-8-4 should give good results in "building up" or repair welding. In the case of gunmetals of the 86-7-5-2 and 85-5-5-5 types welding becomes increasingly difficult and it may be more practical to use oxyacetylene brazing. The carbon arc process could also be employed in many cases, using phosphor bronze rod containing 3 to 10 per cent tin and

TABLE IV
Maximum Allowable Working Stresses in Lbs. per Sq. In.

Material	For Metal Temperatures Not Exceeding Deg. F.								
	Sub Zero	70 to 100	150	250	350	400	450	500	550
86-7-5-2 gunmetal.....	6800	6800	6800	6300	5800	5400	5000	4200	3300
85-5-5-5 gunmetal.....	5500	5500	5500	5000	4500	3500	—	—	—

TABLE V
Physical Properties of Low Tin Content Gunmetals and Cast Brasses in Comparison with 88-10-2 Gunmetal

Properties	Gunmetals				Cast Brass	
	88-10-2 88-8-4 8.6—8.8	86-7-5-2 8.6—8.8	85-5-5-5 8.6—8.8	Type A 8.45—8.55	Type B 8.4—8.5	
Specific gravity.....	0.314	0.314	0.314	0.30	0.30	
Weight per cu. in., lb.....	0.314	0.314	0.314	0.30	0.30	
Coefficient of expansion	70—212 deg. F..... 70—392 deg. F..... 70—572 deg. F..... 70—752 deg. F..... 70—932 deg. F.....	17.5 17.6 17.9 18.0 18.1	17.7 17.9 18.2 18.4 18.6	17.8 18.1 18.4 18.7 19.0	17.9 18.4 19.0 19.6 20.2	19.4 20.5 21.8 — —
Thermal conductivity	Approx. 13—15 per cent. of that of copper at 70 deg. F.				Approx. 18—22 per cent of that of Cu at 70 deg. F.	Approx. 16—20 per cent of that of Cu at 70 deg. F.
Electrical resistance						

about 0.3 per cent phosphorus. Again alloys 88-10-2 and 88-8-4 should give fairly good results, but 86-7-5-2 and 85-5-5-5 types will be more difficult. In general, the success of the process depends to a large extent upon the soundness of the castings, gassy castings being almost impossible to weld without producing gassy welds. The high thermal conductivity of gunmetals frequently renders the oxy-acetylene welding process difficult.

In Table VII there is a list of some potential applications for the gunmetals which have been discussed here.

References

¹ H. J. French, S. J. Rosenberg, W. Le C. Harbaugh and H. C. Cross, "Wear and Mechanical Properties of Railroad Bearing Bronzes at Different Temperatures," *Journal of Research*,

TABLE VI
Corrosion of Cast Bronze, Gunmetal and Brass in Fresh and Sea Water at 60 and 200 Deg. F.

Alloy	Loss in Grams Per Sq. m. Per 24 Hr.			
	Tap Water		Sea Water	
	60 deg. F.	200 deg. F.	60 deg. F.	200 deg. F.
Admiralty manganese brass	0.27	0.43	1.19	2.00
Gunmetal, 85-8-2½-3½	0.14	0.28	1.23	0.75
Cast phosphor bronze	0.09	0.11	1.20	0.64
Cast 90-10 bronze	0.14	0.19	0.87	0.71

Research Paper No. 13, U. S. Bureau of Standards, vol. I, September, 1928.

² H. J. French and M. E. Staples, "Bearing Bronzes With and Without

Zinc," *Ibid*, vol. II³ (R. P. 68), June, 1929.

³ L. W. Spring, "Some Considerations and Tests for Cast Materials for High-Temperature, High-Pressure Service," Proc. Institute of British Foundrymen; vol. XXIV, 1930-31, p. 239.

⁴ W. C. Stewart, Amer. Soc. Naval Engineers, 1938, vol. L, p. 107.

⁵ J. W. Bolton, Proc. Amer. Soc. Testing Materials, 1935, vol. XXXV, part 2, pp. 204-217.

⁶ "Rules for Construction of Unfired Pressure Vessels," section 8, A.S.M.E. Boiler Construction Code, 1940 edition.

⁷ J. Strauss, "Metals and Alloys for Industrial Applications Requiring Extreme Stability," Trans. Amer. Soc. Steel Treating, 1929, vol. XVI, p. 191.

Editor's Note: This review of the properties and applications of the low tin bronze alloys will be concluded next week with data on foundry practice and properties of Types A and B cast brasses.

TABLE VII
Suggested Applications of Gunmetals

Type Composition	B.S.S. No.	Signed Application
88-10-2	383	To be used only for special applications, i.e., high-pressure hydraulic and air valves working between 1000 to 4000 lb. per sq. in., control and stop valves, steering gear telemotor cylinders. Special unlubricated bearings subjected to pounding, vibration and corrosion, e.g., rudder post liners and bushings, steering gear bearings, etc.
88-8-4	—	Suitable for conditions of service intermediate between those specified for alloys of 88-10-2 and 86-7-5-2 type, e.g., hydraulic valves working between 500 to 1000 lb. per sq. in. (Does not possess much advantage over alloy of 86-7-5-2 type so far as steam service is concerned.) Sea cocks and other valves connected direct to hull below water-line.* Pump impellers. Stern tubes.
86-7-5-2	—	Suitable for all general-purpose castings subject to medium steam pressures (above 100 lb. per sq. in. working pressure) and at temperatures not exceeding 500 deg. F. (260 deg. C.), e.g., small engine control and boiler stop valves, cylinder cover bushes, neck rings, centrifugal pump casings, tail shaft liners and stern tube bushes. Hydraulic valves operating between 200 to 500 lb. per sq. in. pressure. Suitable for high-grade backings of lined bearings. Slip rings for electrical equipment (under 2 per cent lead if possible).
85-5-5-5	898	Suitable for general-purpose castings subject to steam up to 100 lb. per sq. in. working pressure and temperatures not exceeding 400 deg. F. (205 deg. C.) and water pressures up to 200 lb. per sq. in. working pressure, e.g., screw down valves, bulkhead and deck fittings, tee-pieces, etc., handling auxiliary steam heating services to galleys, pantries and thermo-tanks. Cocks, taps and sanitary fittings handling sea water, e.g., pump-type lavatory valves. Pumping, flooding and draining valves not directly connected to hull below water-line. Sluice valves to sea cocks. Fire hose connections. Centrifugal pump casings. Suitable for well-supported backings of certain lined bearings, e.g., small stern tube bushings, etc.

*The use of cast aluminum bronze is more suitable, as there is no galvanic action between this alloy and steel in the presence of sea water.



40-mm. Anti-Aircraft Gun Carriage Redesigned for Welding

By DR. JOHN L. MILLER
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DURING February, 1941, the Firestone Tire & Rubber Co. was approached by the commanding officer of the Cleveland Ordnance District, with a request that this company consider the redesign and manufacture of a 40-mm. anti-aircraft gun carriage. This gun carriage was to be made over the lines of the Swedish Bofors automatic anti-aircraft cannon. The civil war in Spain had demonstrated the value of an intermediate caliber, automatic cannon for defense of vital supply centers and for defense of field troops against operations of low-flying aircraft. During that period, the 40-mm. Bofors gun proved its efficiency and reliability. Since then this gun has been widely adopted, particularly by the British and now by the American forces.

The Redesign Period

An imported mount was made available for our study. Such drawings as were furnished showed dimensions in the metric system and employed metric or first angle projections. It was required to transpose all these drawings to accord with U. S. Ordnance Standards, plus the introduction of 460 United States Government standard data sheets for parts such as nuts, bolts, screws and washers. There are 1485 individual parts in the gun carriage. Another extremely important transposition involved changes of all materials used in fabrication so as to make them available within the United States. A complicating restriction imposed

. . . Dr. Miller won the second grand award (\$11,200) in the 1940-42 industrial progress award program sponsored by the James F. Lincoln Arc Welding Foundation, Cleveland. The accompanying data and illustrations have been abstracted from Dr. Miller's original paper. The 2½-year welding study, in which 408 awards totaling \$200,000 were made, indicated a possible annual cost saving by arc welding of \$1,825,000,000, and a saving of 7,000,000 tons of steel valued at \$271,000,000 and 153,000,000 man-hours of labor.

was the necessity for selection of materials adequate for the intended service but containing a minimum of highly strategic alloying elements. The material changes made almost completely eliminated the nickel alloy steels found in the British model. In most cases these material changes were accomplished without reduction of the unit area physical properties by taking full advantage of modern processing and heat treating methods. Extensive use was made of the new low alloy, high strength steels.

During this period, many design changes were approved by the Ordnance Department. Important design changes which are saving millions of dollars in machine tools and in man-hours of labor are the employment of welded construction, the use of a single ball thrust bearing instead of a double ball thrust bearing for the traversing gear, the elimination of thrust bearings in the elevating gears, the use of sleeve bearings made from

powdered and sintered metals instead of solid bronzes, a tubular welded axle construction instead of a forged axle, a change in the method of mounting the gun trunnions on the top carriage, the employment of rubber bumpers instead of a steel spring within the draft connector and the use of four-wheel electric brakes, instead of two-wheel hydraulic brakes.

Change to Welded Design

Of these the most important was the use of welded instead of riveted construction.

The entire frame structures of the original Bofors gun and of the English adaptation of it were riveted. This included the chassis, the top carriage and the elevating gear segment. Over 1000 rivets were required to complete these assemblies.

The ordnance designers had suggested that we investigate the possibility of welded construction for the chassis and top carriage.

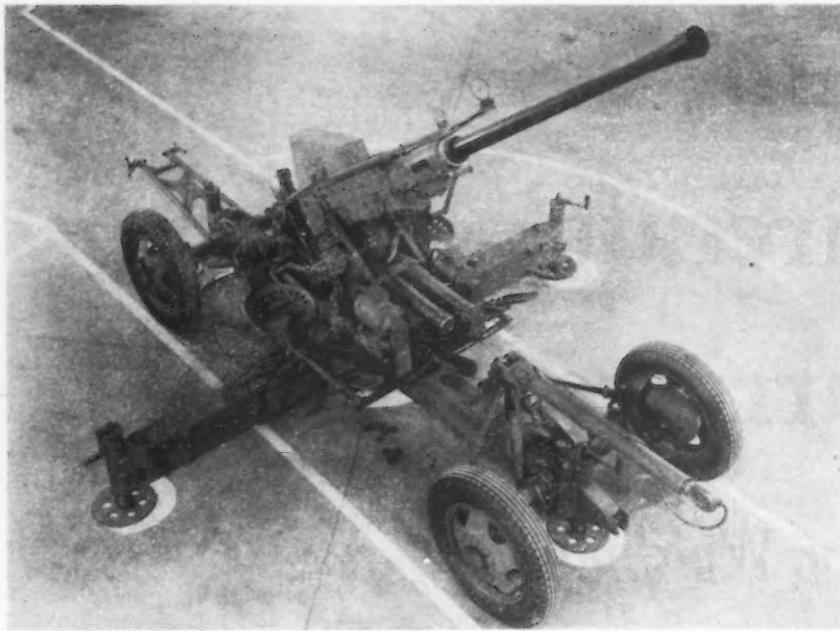
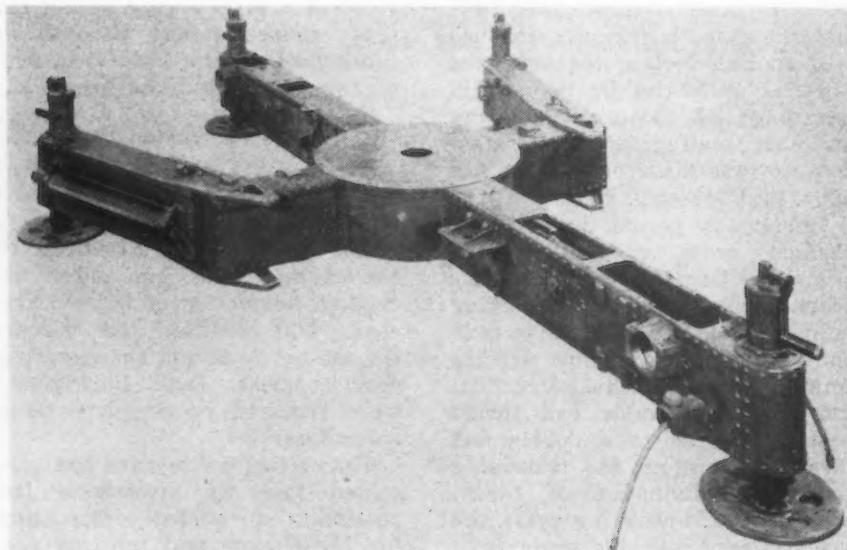


FIG. 1—The 40-mm. anti-aircraft gun is mounted on a top carriage attached to a cross bed chassis having lateral outriggers. This chassis is mounted on four wheels equipped with 6.00 x 20 transport tires having bullet resisting tubes, all wheels having electric brakes. The carriage wheel base is 126 in. The gun may be elevated from -5 deg. to +90 deg., and may be traversed 360 deg. The projectile has a weight of approximately 2.2 lb. and leaves the muzzle at a velocity of 2850 ft. per sec. Shots may be fired at the rate of 120-140 per min., usually in bursts of 4-6 shells. In view of its rapid maneuverability, the gun is adapted particularly to use against low-flying aircraft, including dive bombers. It has a maximum horizontal range of approximately 11,000 yards and a maximum vertical range of approximately 5400 yards. The effective range is 2500 yards horizontal or vertical. During firing, the gun carriage is supported at four points by jacks having large diameter foot plates and is additionally secured by four stakes driven into the ground, guided by brackets attached to the chassis. The front and rear wheels are retracted during firing. The total weight of the complete gun and gun carriage is approximately 6000 lb.

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FIG. 2—A close-up view of the riveted chassis sent from England as a model for construction of the 40-mm. M1 anti-aircraft gun carriage. Notice the riveted construction used throughout.



Welded designs for these parts were developed by Firestone, assisted by subcontractor engineers, and the use of welding extended to include many other components. This redesign was all the more remarkable in that it had to be conducted simultaneously with the transformation from the metric to the American system and with the change from foreign to American materials, with a minimum of time lost in getting into production. The weldability of each material forming part of a welded assembly was carefully considered and chemical analyses controlled to give the best welding characteristics consistent with strength requirements. To insure relief of local locked-up stresses occurring during welding and cooling from welding temperatures, it was decided to stress relieve all important weldments. Therefore, the minimum design strength of each welded material was determined in terms of its room temperature strength after exposure to a temperature of 1150 deg. F. for a minimum period of 1 hr.

In order to meet the strength requirements of the Army Ordnance Department (much more rigid than those applied to foreign designs) all the plates in the gun carriage were made 50 per cent thicker.

As the drawings for the redesigned gun carriage were completed, they were immediately used for the construction of parts for two experimental models. These pilot models were completed in June, 1941, and sent to the Aberdeen Proving Grounds where exhaustive roadability and firing tests were conducted. Gun breeches and tubes were obtained from a Canadian source. These Aberdeen tests proved the general excellence of the redesigned welded carriage, although slight increases in the sectional thickness of a few parts subsequently were made. Also, an additional straightening member at the front of the carriage was added and the draft connector was made longer and heavier. This redesigned and improved carriage is now able to travel at the highest speed of which the prime mover is capable, and within 1 min., be placed in firing position with complete assurance that firing accuracy has not been impaired. This required firing accuracy is dependent as much upon the strength and precision built into the carriage as into the manufacture of the breech and tube, because the elevating and traversing mechanisms form part of the car-

riage. Any lack of gun carriage rigidity during travel or during actual firing would be translated to these mechanisms, causing overstressing with consequent distortion.

During the redesign period, detailed estimates of the expected costs of riveted and welded constructions were developed. These estimates indicated that a welded construction would save considerable money and labor, and the employment of welding jigs and fixtures made the welded construction more advantageous for quantity production. The design of carriage details is not static and in a minor way is changing from day to day. But whatever the design change may be, it is necessary that each important part or subassembly be made interchangeable with foreign models and with carriages produced during other stages of our manufacture.

Separate Organization Set Up

In order to accelerate production on this contract, a separate group of buildings and a personnel distinct from that of the parent company were established. Executive, designing, purchasing, planning, materials, metallurgical, machining, assembling and accounting departments were formed. Close cooperation between each department was essential and each was placed as close to the other as space limitations permitted.

In view of the magnitude of the undertaking and the comparatively short time available in which to get this new undertaking into production, a large number of firms were engaged to supply many of the subassemblies. Today as many as four different firms are fabricating the same subassembly. In view of this, actual costs of fabrication necessarily vary from plant to plant. Another factor complicating the establishment of exact cost figures is the continually accelerating program arising from the national emergency.

Qualifying Welders

Each contractor for each welded subassembly is required to train welders so that they may be able to qualify in accordance with the requirements of Federal Specifications WXS-31, "Welding of Steel, Arc, General Specifications For," and AXS-476, "Radiographic Inspection of Welds." To qualify for welding, each welder is required to make butt and fillet type test plates. If the surface appearance is judged

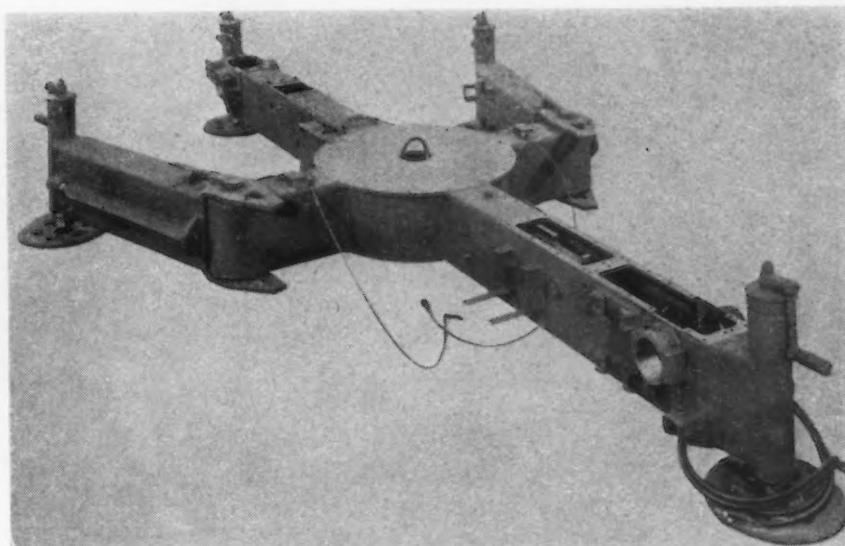


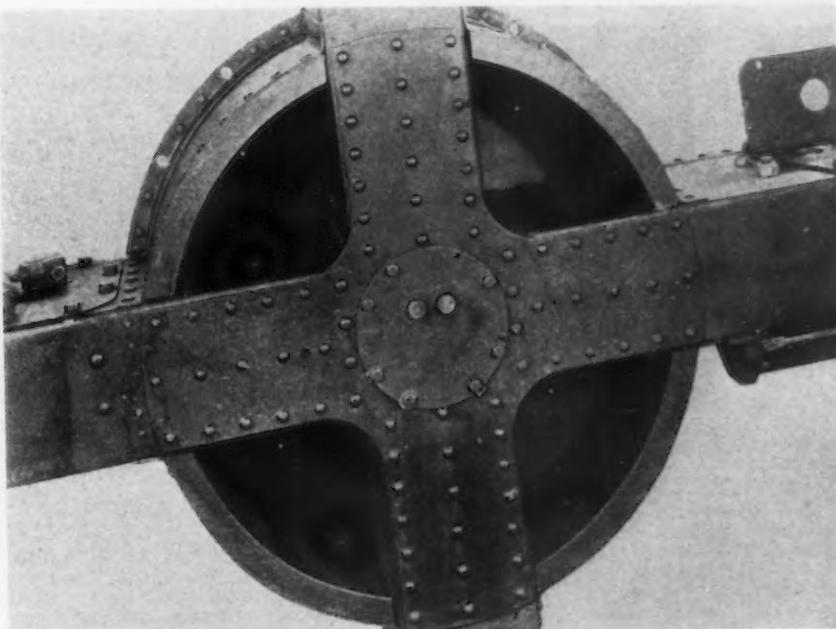
FIG. 3—A close-up view of the redesigned chassis in which welded construction has been employed. This figure should be compared with Fig. 2.

satisfactory, these test plates are then X-rayed in accordance with AXS-476 requirements and, if acceptable, the test plates are then stress relieved. Three tensile test and three bend test specimens are then machined from the stress relieved plates and tested to determine if the weld metal satisfies the specification requirements for the materials being joined. These tests are conducted under the supervision of government inspectors of the Ordnance District in whose territory the welder is to work. At least one month of actual welding under the direction of a competent supervisor is required to train an inexperienced welder so that he is able to meet government specifications.

Chassis Construction

At present, three subcontractors are engaged in the manufacture of the chassis. As indicated in Figs. 2 and 3, this chassis is of the box girder type, having two outriggers. The steel used in the redesigned chassis construction is of the low alloy high strength type, supplied under Federal Specification 57-114-1, Class B, Grade 2. This specification limits the chemical analysis to a maximum carbon content of 0.25 per cent, leaving additions of other elements unrestricted. It

FIG. 4—A bottom view showing the riveted construction employed in making the tub or central section of the foreign model.



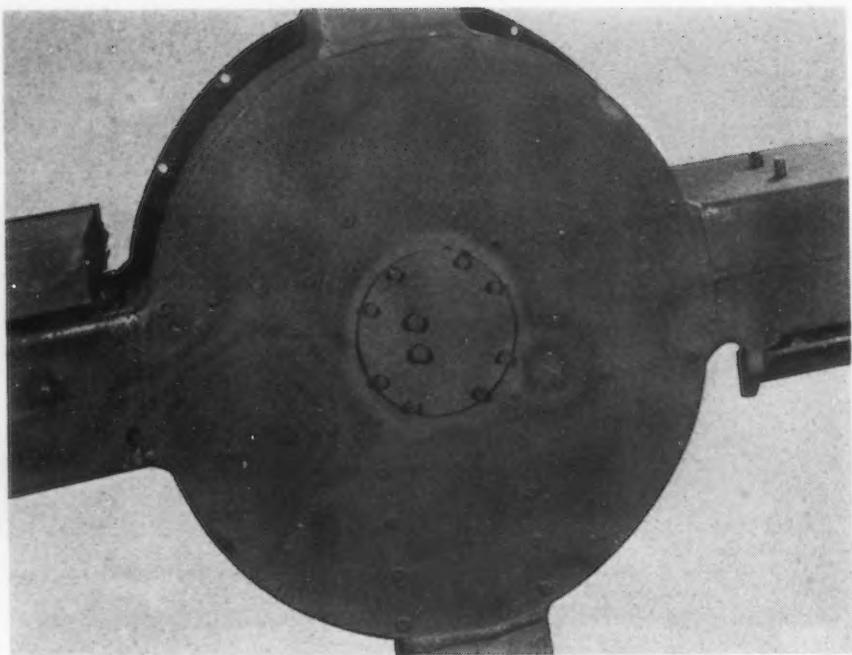


FIG. 5—A bottom view showing the welded construction used in the fabrication of the welded tub.

imposes a physical property limitation of 50,000 lb. per sq. in. minimum yield strength, 95,000 lb. maximum tensile strength and 20 per cent minimum elongation in 2 in. The material actually used conforms to the following approximate chemical composition in per cent:

Carbon	0.10-0.20	Zirconium	0.10-0.20
Manganese	0.50-0.70	Sulphur	0.04 max.
Silicon	0.60-0.90	Phosphorus	0.04 max.
Chromium	0.50-0.65		

The plates forming the box sec-

tions are 3/16 in. in thickness and the plates forming the tub or central section are 1/2 and 3/16 in. in thickness. All of the subassemblies are positioned for welding. Plain carbon steel, covered electrodes, 5/32 in. in diameter are used. No special preparation of the joints is necessary, but a low carbon steel backing-up strip is employed. For the complete welding of the chassis 66 lb. of electrodes are required. In Table 1 are shown typical physi-

cal properties secured on experimental test plates, which had been stress relieved at a temperature of 1150 deg. F. Included in this table is a typical weld metal chemical analysis as obtained from single bead welds made on 3/16 in. thick butt welds.

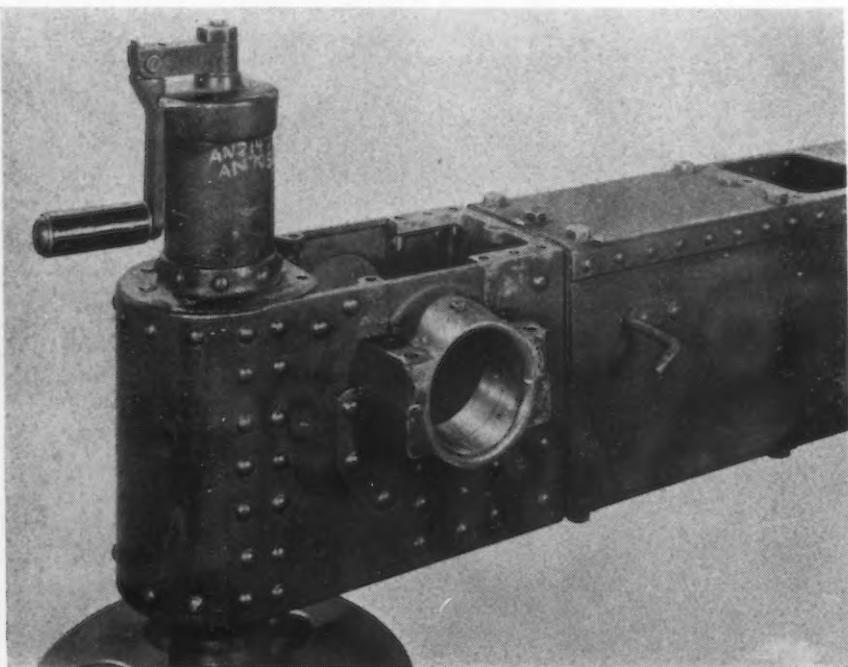
Fig. 2 is a view of the riveted construction used in the foreign model, while Fig. 3 illustrates the corresponding welded construction now being used for the carriage chassis. The welding methods used in attaching brackets, stake supports, outrigger locks and other parts to the chassis frame should be compared with the procedure employed in fastening corresponding parts on the foreign model. Figs. 4 and 5 contrast the designs employed in forming the bottom section of the drum or central section. The foreign design does not completely cover the bottom of the tub, because of the necessity for getting on the inside to rivet. It will be noted that a double plate is required to secure the needed strength. The welded design consists of a single plate which completely covers the tub bottom, thus adding needed strength without the necessity of having an additional plate.

Fig. 6 shows the construction employed at the front or swivel end of the foreign model. Aside from the riveted construction, a needlessly expensive method of securing the bearing surface for the axle tube was used. The redesigned front end, Fig. 7, employs powdered and sintered metal sleeve bearings for the axle tube. The simplified lines and the increased rigidity made possible by the use of arc welding are apparent in the photograph.

Rigidity Tests

Exhaustive deflection tests to determine rigidity of the chassis in comparison with the imported model were made to check the redesign calculations and the unit strength of the metals and welds in the new chassis. Two chassis, one the English riveted model, and the other our welded chassis, were placed on a level concrete floor with the outriggers in the contracted position. Six dial indicators were mounted on separate supports under the central or tub section and equispaced in a circle. A 3000 lb. weight, representing a static overload of 75 per cent, was placed on top of the tub section and the deflection noted on each of the six dial indicators. This test was repeated

FIG. 6—A close-up view of the riveted design used at the front or swivel end of the foreign model.



several times with the following average deflections:

Riveted chassis	0.079 in.
Welded chassis	0.051 in.

The difference of 0.028 in. in favor of the welded chassis corresponds to $0.028/0.051 \times 100$ or 55 per cent greater strength for the welded chassis. Both chassis returned to their original positions when the loads were removed, indicating that no permanent deformation had taken place. Other similar deflection tests on the front, rear, left and right ends gave corresponding results, all of which were later confirmed by road tests.

The weight of the British riveted chassis is 824 lb. and the weight of our welded chassis without the steering support is 1071 lb. The weight difference of 247 lb. combined with the welded design has produced this 55 per cent strength increase. The increase in strength resulting from the use of welded construction is 25 per cent, calculated as follows:

247

$\frac{247}{824} = 30$ per cent additional strength resulting from increase in amount of metal used

$55 - 30 = 25$ per cent additional strength resulting from the welded design.

This additional strength is due to the fact that the welded chassis functions as an integral unit under stress. The nose piece, Fig. 7, adds greatly to the strength of the front end of the carriage as it forms a rigid support for the steering mechanism. This addition to the foreign model greatly improves the road performance of the American model.

Materials Used

In order to insure weldability of all brackets, supports and locks attached to the chassis, the chemical analysis of each part was closely controlled and the specifications for physical properties were established with these chemical limitations in mind. In Table II are shown the physical property requirements for the chassis parts and in Table III, the chemical analyses of the materials used.

All of the welds shown in the illustrations are single bead, plain carbon steel, covered electrode, metallic arc deposits. For the frame proper, a low carbon steel backing-up strip is employed with little scarfing or other preparation of the welded joint required. Pickup of alloying elements from the alloy plate during welding assures weld

metal physical properties comparable with the values characteristic of the plate material. Check tests give results similar to those shown in Table I.

Less Man-Hours Required

Comparable total labor costs for riveted and for welded constructions were developed for the chassis. The estimates indicated that 282 man hours of labor would be

required for riveted construction and only 218 man hours of labor for welded construction. A charge of \$0.004 per lb. of metal for stress relieving was applied against the welded construction total labor charge. In these preliminary estimates, assumption was made that the material costs would be about the same and no effort to develop relative costs in terms of material differences was made. Based on an

TABLE I
Physical and Chemical Property Values—Experimental Plain Carbon Steel Welds on Low Alloy, High-Strength Steel

Yield Strength Lb. Per Sq. In.	Tensile Strength Lb. Per Sq. In.	Per Cent Elongation Free Bend Test	Average Analysis Per Cent
60,960	84,020	38.0	Carbon 0.15
59,590	79,540	56.0	Manganese 0.53
55,580	78,900	42.0	Silicon 0.43
58,160	77,790	46.0	Chromium 0.31
59,910	76,930	44.2	Nitrogen 0.015
54,440	80,100	54.0	
57,000	79,030	45.2	
57,440	78,860	48.0	
53,570	77,620	62.0	
59,050	77,850	39.5	

TABLE II
Physical Properties of Parts Used in the Chassis

Part Name	Material	Yield Strength Lb. Per Sq. In.	Tensile Strength Lb. Per Sq. In.	Per Cent Elongation in 2 in.	Per Cent Reduction of Area
Spline shaft	WD 1035	65,000	81,000	16	.....
Eccentric sleeve	WD X4130	75,000	100,000	20	.....
Jack tube	WD 1020	53,000	64,000	23	.....
Backing strip and jack tube plate	WD X1020	40,000	60,000	20	40
Rib support and side plates	Low alloy High strength steel	50,000	95,000	20	.....
Stake bracket guide	Steel casting	53,000	85,000	22	35
Eccentric boss	WD X1020	40,000	60,000	20	40
Top plate, end plate, eccentric bracket and bottom plate	Low alloy High strength steel	50,000	95,000	20	.....
Cap reinforcing block and stake tip	WD 1035	40,000	70,000	20	40

TABLE III
Chemical Analyses of Materials Used for Parts of Chassis

Material	C.	Mn.	P. Max.	S. Max.	Cr.	Other Elements
WD 1035	.30-.40	.60-.90	.045	.055	.....	Mo. .15-.25
WD X4130	.25-.35	.40-.60	.040	.050	.80-1.10	Si. .60-.90
Low alloy, high strength steel	.10-.20	.50-.70	.040	.040	.50-.65	Zr. .10-.20
WD 1020	.15-.25	.30-.60	.045	.055	.....	Mo. .40-.65
WD X1020	.15-.25	.70-1.00	.045	.055	.....	Si. .55 max.
Steel casting	.30 max.	1.10 max.	.050	.065	.....

TABLE V
Detail of Costs on Top Carriage—Riveted vs. Welded Construction

Part Description	Riveted Construction Estimated Costs		Welded Construction Actual Costs	
	Material <i>A</i>	Labor <i>B</i>	Material <i>C</i>	Labor <i>D</i>
Turtable, cast or forged base. Welded base.	\$55.00	\$6.94	\$47.00	\$6.94
Side frame parts..... <i>B</i> requires 7 drilled holes for rivets.	.46	.76	.46	.62
Side plate—2 required..... <i>B</i> requires 43 more holes than <i>D</i> but no additional piercing charge is warranted.	4.28	3.20	4.28	3.20
Spacer..... Additional flange required for <i>A</i> to permit riveting. <i>B</i> is greater than <i>D</i> as 44 rivet holes must be pierced.	.40	.30	.27	.08
Bearing base..... <i>B</i> requires four pierced holes for riveting.	2.32	.68	2.32	.60
Bracket..... <i>B</i> requires one added hole drilled.	1.23	.53	1.24	.51
Mounting bracket..... <i>B</i> requires one added hole drilled.	.16	.38	1.16	.36
Bushing..... Spacer..... Additional flange required for <i>A</i> to permit riveting. <i>B</i> requires 24 holes for riveting.	.17	.28	.17	.28
Spacer..... Additional flange required for <i>A</i> to permit riveting. <i>B</i> requires 22 holes for riveting.	.14	.28	.07	.16
Spacer—8 required..... Riveting requires 68 tubular spacers.	.68	2.04	.16	.48
Totals	\$9.99	\$9.12	\$9.20	\$6.45
Side frame parts..... Same as above plus parts listed below:	\$9.99	\$9.12	\$9.20	\$6.45
Boss..... Bearing..... Clip—2 required..... Plate..... Less Bracket.....	.01 .09 .04 .01 -.16	.06 .08 .16 .12 -.38	.01 .09 .04 .01 -.16	.06 .08 .16 .12 -.38
Totals	\$9.98	\$9.16	\$9.19	\$6.49
Side frame assembly..... 1. Weld complete (2½ lb.)..... Rivet complete (68 rivets)..... 2. Other identical operations.....	\$.39	\$2.72	\$.22	\$2.91
		.62		.62
Totals	\$.39	\$3.34	\$.22	\$3.28
Side frame assembly..... 1. Weld complete (2½ lb.)..... Rivet complete (68 rivets)..... 2. Other identical operations.....	\$.39	\$2.72	\$.22	\$2.91
		.62		.62
Totals	\$.39	\$3.34	\$.22	\$3.53
Top carriage assembly..... 1. Weld complete (5 lb.)..... Bolt complete (32)..... 2. Check in fixture..... 3. Stress relieve (300 lb. at \$0.004 per lb.)..... 4. Check in fixture..... 5. Dress welds.....	\$.64	\$1.28	\$.45	\$4.29
		.16		.16 1.20 .14 .60
Totals	\$.64	\$1.44	\$.45	\$6.39
Machining assembly..... Body tube assembly.....	\$.38 2.12	\$14.94 3.48	\$.38 2.12	\$14.94 3.48
Totals	\$130.65		\$120.28	

(Figures do not include overhead or any profit.)

hourly labor rate of \$1.20, this preliminary estimate indicated that a saving of \$76.80 per chassis could be effected if welded construction were adopted. Actual costs of welded construction reported during May, 1942, are as shown below in comparison with the estimated welding costs:

	Estimated Costs	Actual Costs
Material	\$167.31	
Labor involved in welding	\$68.40	74.80*
Total labor	261.60	238.20
Stress relieving cost	4.34	3.91
Total cost (excluding overhead and profit) 433.25		409.42

*The actual welding time exceeded the estimate because of repairs made necessary by critical Ordnance inspection.

Top Carriage

After the advantages of the welded construction applied to the chassis had been developed, a study applied to the top carriage indicated that a welded design would be both cheaper and stronger. In comparison with a weight of 264 lb. for the foreign model of riveted construction, the redesigned top carriage weighs 300 lb. The calculated weight of a riveted structure of equivalent thickness is 317 lb. This top carriage is made by attaching the uprights to the turntable which is fabricated of pressed and formed parts welded together. These parts are formed from the same quality steel used in the plate construction of the chassis. The high strength, low alloy steel plates forming the upright box section are punched, placed in welding jigs, and edge and slot welded together. In Figs. 8 and 9 are shown corresponding views of the riveted and welded designs of the top carriage. The different angle of mounting and the different bearing construction employed for the breach connection are apparent as are the slot type welds used in joining the side plates to the internal stiffeners.

The preliminary estimated cost comparison for the riveted top carriage and actual costs for the welded one are shown in Table IV. A detail of the estimated cost of riveting in comparison with the actual cost of welding is given in Table V. The information given in this table typifies the procedure followed in the studying of all the weld redesigned parts.

The elevating arc is mounted at the bottom of the breech and engages a gear arrangement attached to the top carriage which permits the gun to elevate through an arc of minus 5 deg. to plus 90 deg. The two designs are compared in Fig. 10. The physical properties of the steel parts used in the welded construction are shown in Table VI.

In order to eliminate cracking and to minimize distortion as a result of welding, all welds are staggered during deposition. This precaution has been necessary particularly in view of the use of heat treated WD X4130 steel for the gear itself. The gear sector is stress relieved at 1150 deg. F. before machining. The same steel thickness was used in both the riveted and the welded sectors and this part offers a direct comparison as to the weight advantage of welding. Because of the presence of rivets, the riveted construction weighs 42 lb. or 3½ lb. more than the welded sector. Such a weight advantage would have been common to most of the weldments in comparison with the riveted construction had the same steel thicknesses been maintained. Preliminary estimates had shown a welding cost of \$2.11 each for the welded gear sector in comparison with a cost of \$2.96 for the assembly of the riveted construction. This amount included cost of stress relieving the weldment. The actual welding cost for the gear sector as of May 1, 1942, was \$1.61 each, the lowered cost being due to more efficient handling and more rapid welding than had been allowed.

Front and Rear Axles

The axles of the foreign models had been forged by upsetting the ends of solid steel bars and then they were machined as indicated in Fig. 11, upper view. Such a method of fabrication is relatively expensive, needlessly wasteful of material and a slow production method. The axles used on the redesigned carriage (Fig. II, lower view) were fabricated from WD 1035 tubing, cold drawn and finish annealed, to which were welded cast steel heads. These steel castings are purchased in accordance with Federal Specification QQ-S-681, Class 4, which requires a yield strength of 53,000 lb. per sq. in. minimum, 85,000 lb. tensile strength, 22 per cent elongation, and 35 per cent reduction of area.

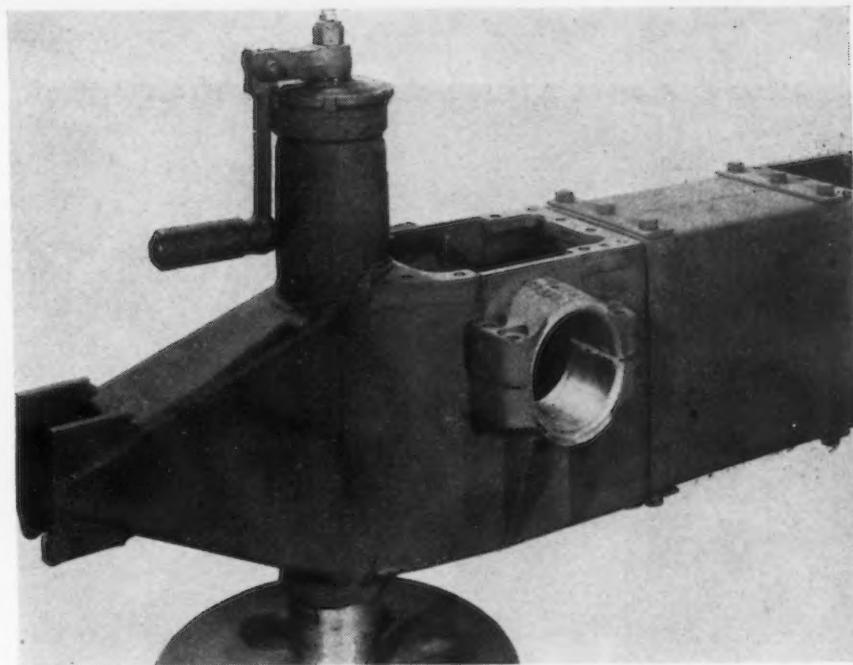


FIG. 7—The front or swivel end of the welded chassis. Note the simplified and weight saving feature shown for the bearing support. Note also the additional nose piece which greatly adds to front end strength and makes possible travel over much rougher roads.

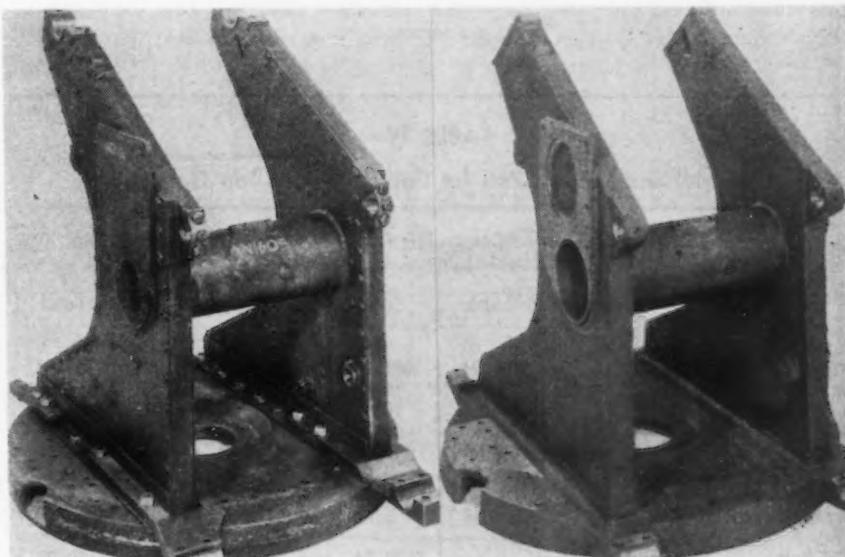


FIG. 8—(Left) A view of the foreign model top carriage employing riveted and bolted construction. The base plate or turntable was made as a forging. (Right) The redesigned top carriage. Greater strength and neater appearance at reduced cost have been obtained.

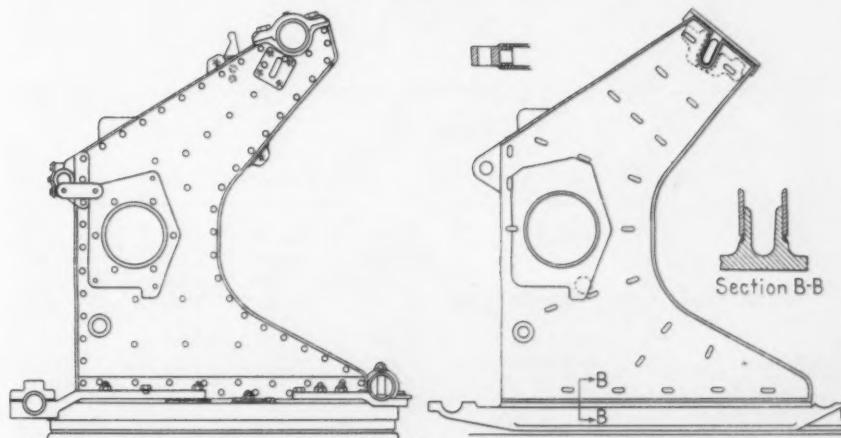


FIG. 9—General features of construction of the riveted top carriage and the welded top carriage, showing the use of slot welds for holding internal braces.

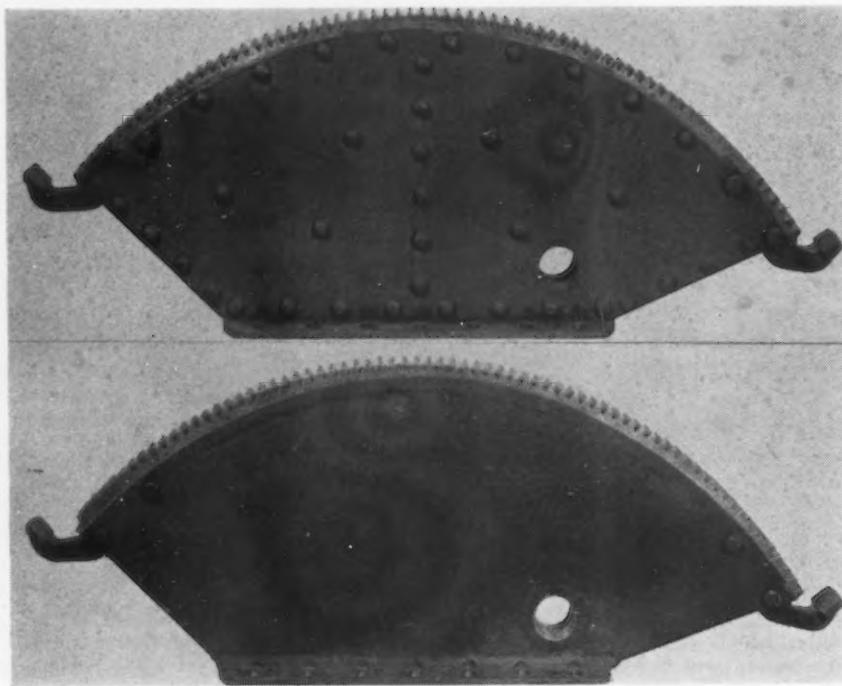


FIG. 10—Illustrations contrasting the riveted and welded designs used for the elevating arc sector.

TABLE IV
Material and Labor Costs for Fabrication of Top Carriage

Part Name	Riveted Construction Estimated Costs			Welded Construction Actual Costs		
	Material	Labor	Total	Material	Labor	Total
Turntable.....	\$55.00	\$6.94	\$61.94	\$47.00	\$6.94	\$53.94
Side frame parts.....	9.99	9.12	19.11	9.20	6.45	15.65
Side frame parts.....	9.98	9.16	19.14	9.19	6.49	15.68
Side frame assembly.....	.39	3.34	3.73	.22	3.53	3.75
Side frame.....	.39	3.34	3.73	.22	3.28	3.50
Top carriage assembly.....	.64	1.44	2.08	.45	6.39	6.84
Top carriage machining.....	.38	14.94	15.32	.38	14.94	15.32
Body tube assembly.....	2.12	3.48	5.60	2.12	3.48	5.60
Totals.....			\$130.65			\$120.28

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TABLE VI
Physical Properties of Parts Used in Elevating Gear

Part Name	Material	Yield Strength Lb. Per Sq. In.	Tensile Strength Lb. Per Sq. In.	Elongation Per Cent	Reduction of Area Per Cent
Base.....	WD 1035	55,000	70,000	20	40
Gear Segment.....	WD X4130	75,000	100,000	20	40
Stop.....	WD X4130	75,000	100,000	20	40
Side plates.....	Low alloy	50,000	95,000	20	40
	High strength steel				
Spacers.....	WD 1020	40,000	60,000	20	40
Shim.....	WD 1020	40,000	60,000	20	40

The chemical analysis of the cast heads is as follows:

	Per Cent
Carbon	0.30 max.
Manganese	1.10 max.
Sulphur	0.065 max.
Phosphorus	0.05 max.
Silicon	0.55 max.
Molybdenum	0.40-0.65

The weld joints are prepared by machining before welding. The axles are positioned for welding and welding is accomplished using $\frac{1}{4}$ in. covered carbon-molybdenum steel rods. Estimates indicated that material and labor costs of an axle as made in the foreign manner would be \$110 as contrasted to an amount of \$42.08 for the

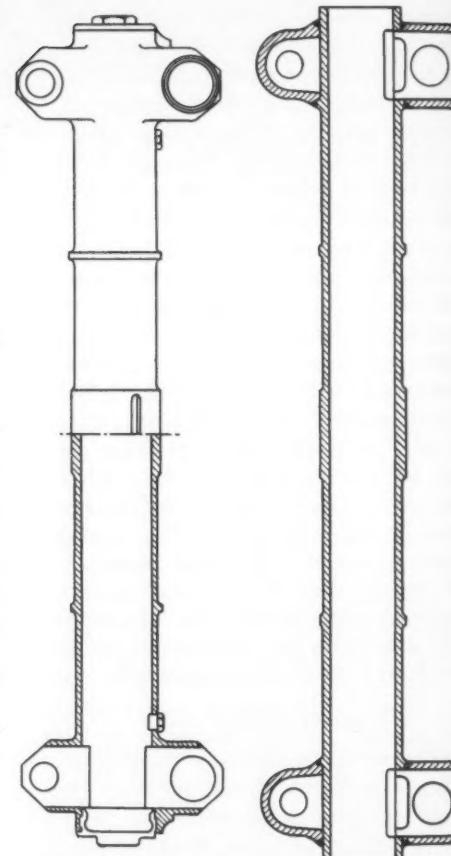


FIG. 11—General features of the forged and of the tubular welded axle construction.

tube and welded construction. This item is subcontracted and no actual cost data is available to compare with the estimate, but the placing of an additional contract at a price lower than the original indicates that this estimated cost is not being exceeded.

In Table 7 is shown a summary of the weights for the important redesigned welded subassemblies, the comparable weight for the English model and the calculated weight of a riveted design having

the same metal thicknesses as used in the welded carriage.

In view of the nature of many of the subcontracts, it is not possible to show in a definite way the money savings that have resulted from the employment of welded construction. From the information now at hand, the indicated saving is approximately \$160 per gun carriage. The cost of materials and the cost of the close machine work required on so many parts which are in no way influenced by the welded design, however, make the actual saving rather small in terms of the total cost of the gun carriage.

Closure

In times as momentous as these, cost in itself cannot be a deciding factor in the determination of a particular ordnance design. Speed of production and efficiency and reliability during field operation are of greater importance. Several design changes were incorporated in the 40-mm. gun carriage in order

TABLE VII
Weight Comparisons of Various Models

Part Name	American Welded Model	English Riveted Model	Calculated Riveted Model of Heavier Sections
Chassis	1084	824	1155
Top Carriage	300	264	317
Gear Sector	38.5	42	42
Front Axle	114	97*	121
Rear Axle	114	84*	108
Stake (4)	21.5	18	22
Foot Plate (4)	9.5	7.5	10.0
Gun Stay	60.5	58.5	62.0

* These parts are not riveted but forged.

to facilitate production and to improve operation. In achieving these results, the most important change was the conversion from a riveted to a welded construction.

Fundamentally, cost is the sum total of the number of manhours of labor required to produce a completed unit or number of units. A

decrease in cost may be translated to mean an increase in production of units with a given amount of labor. The adoption of the welded design produced an appreciable saving in the final cost of the gun carriages and, therefore, more carriages are now being made within a given period of time.

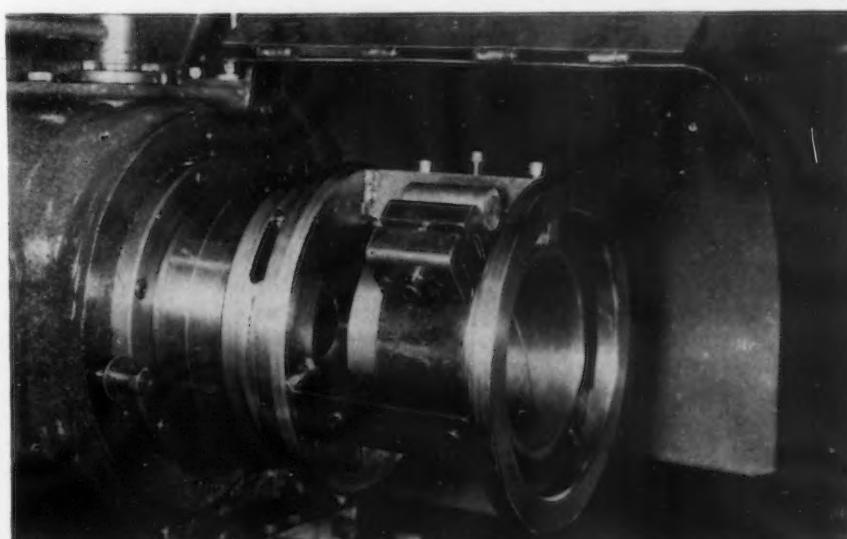
Boring Chuck for Thin Walled Cylinder

ONE of the problems in boring a thin walled metal cylinder is to prevent distortion in the machining operation. On a cylinder 6 in. o.d. and 6 in. long which is to be bored to 5.000 ± 0.001 in. after turning, for example, the pressure required to grip and drive the work in a conventional three-jaw chuck may distort the piece as much as 5 or 6 thousandths, resulting in scrapped work.

At the Lima, Ohio, plant of Westinghouse Electric & Mfg. Co., a special chuck has been developed for such work which eliminates out-of-round distortion on such cylinders. The workpiece is gripped by a spring steel band which is held by clamping lugs which act as a driving dog. The band floats circumferentially in a pot-type holder. This holder has three supports which fit the outside of the piece snugly and control the concentricity of the bore with the o.d. One support has a movable face that can be withdrawn slightly for loading. The supports are slotted on the faces to allow the spring band to pass through freely.

The cylinder is placed in the chuck. The band is clamped tightly around it and provides sufficient friction to drive the cut without distortion in the piece. After the clamp band has been tightened, the clamp and workpiece are rotated

until the lugs stop against one of the supports which serves as a driver. The release screws on the movable face are then tightened with pressure sufficient to hold the cylinder radially but not enough to distort it.



THIS special pot chuck with spring band clamp eliminates distortion when machining cylinders of a fixed diameter.

Health Aspect of the

THE literature dealing with the industrial health aspect of the handling of magnesium and magnesium alloys is rather complete in England, Germany, Italy, and the Scandinavian countries. In American literature, however, the problem has had less consideration from industrial physicians, and it is timely to record the results of Dow's experience in caring for men engaged in handling magnesium and magnesium alloys from brine well to finished product, as well as to give a rather general review of the more important articles from that major portion of the world literature which is readily available.

Many of the processes involved in magnesium metal production and fabrication differ only in minor detail from the procedures used in the handling of other commercial metals. The processes for recovery of magnesium from natural brines and sea water present no new or special health hazards. The same may be said of many other processes involved in the magnesium and magnesium alloy industry.

There does remain, however, a small group of potential risks which have been said to be peculiar to the handling of magnesium and magnesium alloys.

Magnesium is a highly combustible material under certain conditions. So well, however, are the factors governing these conditions understood and managed that burns are now no more frequent or more severe in a magnesium plant than they are in an iron or steel plant of comparable size. Nor do they differ in any way. This problem is well covered in the technical literature and will not be further dealt with here.

Some authors^{1-4, 67} have said that magnesium possesses qualities which make it incompatible with human tissues. This incompatibility is the result of the high degree of solubility of impure magnesium in water, and especially in solutions of various salts. On entering solution, hydrogen gas is evolved.⁴ As

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in any two-phase system, the rate at which magnesium goes into solution is in direct proportion to the surface presented. This should be remembered in interpreting recent works on tolerance of tissues for magnesium.

The incompatibility of magnesium and living tissues is due to a second phenomenon which is probably more true of magnesium than of most metals. At the site of implantation of magnesium into living tissue, there is an area of tissue reaction.⁴⁻¹³ This may, and probably does, progress to local death of tissue. The tissue damage as the result of contact with magnesium is undoubtedly chemical in nature, and proceeds to repair and healing in the same way that healing and repair follow other chemical injuries.⁴⁻¹²⁻¹⁴⁻⁸⁵

Absorption of Magnesium

These two phenomena constitute the disadvantages of contacts of magnesium with tissues. They are the result of a chemical reaction between magnesium and living tissues and have been well known and fully appreciated for half a century.^{4, 5, 10, 14, 20} Magnesium is gradually dissolved and absorbed. This is a highly desirable characteristic and has attracted medical men since it was first observed. Magnesium and magnesium alloys have been used as suture materials, bone plates, bone screws, and bone inlays. Dr. E. C. Huse was one of the first to become interested in the use of magnesium wire as a suture material in surgery.²⁰ In 1878, he wrote an account of his experiences with it and recommended its use.

Seelig¹⁴ points out that if the site of implantation be inspected early there will be found pieces of magnesium and some cellular reaction.

"If inspected later there was no vestige of magnesium or its salts. Absorption was complete."

There was, at one time, much interest in France regarding the use of magnesium and magnesium alloys as supportive material in bone surgery because of the ready absorption. Its use proved disappointing because of the gas formation and the temporary tissue reaction.

Enthusiasm died hard, however, because of the very obvious advantage possessed by the metal in its absorbability. Diligent research has been made by surgeons to discover an alloy which might lack some of the disadvantages of the pure metal and all known alloys. The gases formed and the period of time required for absorption of various sized pieces of the different alloys have been studied by many.¹⁴

The question now arises, "What happens to the magnesium which is dissolved on contact with body fluids?"

When put into solution in serum, magnesium is probably oxidized to magnesium oxide and carried into the general circulation in the form of some salt of magnesium. The benign character of the salts of magnesium is readily attested by their extensive use in medical therapeutics. No one has seriously proposed that magnesium exerts a systemic effect when absorbed from tissue implants.

Magnesium is present in most of the soils of the earth's surface; hence, the body is equipped to metabolize magnesium the same as any of the other common ions of the diet. It is interesting to note in this connection that during the 1920's and early 1930's there was considerable interest in France in the inverse relationship between cancer mortality and magnesium contents of the soil and water of various segments of the earth's surface. The use of various magnesium salts was even advocated as a prophylactic against cancer and some

Magnesium Industry

attempts at its use as treatment were made.

Foreign Bodies

As a foreign body, magnesium may be said to be more inconvenient (because of evolution of gas and local tissue necrosis), but no more harmful than foreign bodies of other materials. The author has seen many men lose time from employment because of wood and heavy metal foreign bodies through abscess formation, lymphangitis, and teonsinovitis. No man in the author's practice, which includes men with approximately one and one-half million work days in the past five years, has lost a single hour as the result, either directly or indirectly, of a magnesium or magnesium alloy sliver or foreign body.

By this, the writer does not mean to imply that bacterial contaminants may not be carried into a puncture wound as readily by magnesium as by any other foreign material. The inescapable fact, however, is that there has never been an hour lost by workmen under the writer's care as the result of penetration of the tissues by a magnesium or magnesium alloy sliver. This includes five men in whom foreign bodies of pure magnesium, magnesium oxide, and magnesium alloy were deliberately inserted.

In the alloy and fabrication departments, magnesium alloy slivers are not only common, they are routine. These are invariably removed on the spot and no further attention is paid to them.

A partial explanation of this freedom from complications with magnesium alloy slivers may be found in the fact that this is newly recovered material which passes promptly from recovery to finished product without lying about to collect contamination from air, dust or soil. Another factor may well be the practice of the Dow Chemical Co. of fabricating and rough machining the material practically dry, with the use of little or no cutting oils.

... A study of men having millions of work hours behind them shows the handling of magnesium and its alloys to be no more dangerous than other common metals. Potential health hazards peculiar to magnesium have no practical significance the author says, reporting on health dangers in the industry, and preventives.

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Considerable literature dealing with magnesium as a foreign body grew up in Germany just prior to the entrance of the United States into the present war. Careful reading of some of these articles, however, creates the suspicion that the troubles encountered with magnesium alloy foreign bodies in tissues were the problems not of the irritating qualities in the metal per se, but of bacterial contamination. In fact, this same suspicion has been voiced by several German writers.¹⁷⁻²⁰

Cutting Oil Complications

It is apparent also from the German articles that cutting oils are rather freely used in the machining of magnesium alloys. Because of the scarcity of oils of all sorts in Germany, these cutting oils are probably used to the limit of their usefulness. This, in turn, probably means increasing bacterial contamination with increasing use.

There are problems in the recovery and fabrication of magnesium and magnesium alloys, but foreign bodies, in the writer's practice, are definitely not one of them. Some of those problems from which trouble may be anticipated are discussed below.

To avoid oxidation during some of the operations in which magnesium metal is being melted and employed in a molten state it is the custom to maintain a sulfur dioxide atmosphere at the molten surface. To accomplish this, flowers of sulfur are regularly sprinkled on or

near the metal surface. Consequently, sulfur dioxide is present in the work room in concentrations which are inversely proportional to the adequacy of ventilation.

Sulfur dioxide is an irritating and, in high concentrations, a toxic gas. It has been well studied,¹⁸ and while safe limits have not been completely agreed upon, it has so far been a problem in the writer's practice only as a nuisance. During the past year 24 men have presented themselves at the medical department with complaints of cough who might reasonably have been expected to have acquired this symptom from inhalation of sulfur dioxide gas. Of these 24, a few undoubtedly had common infectious bronchitis. Stereoscopic X-rays of the chest of all these men were made. In no instance was there evidence of lung pathology and in no instance was there more bronchial thickening than would be expected in a similar random group residing in that part of the country.

Sulfur dioxide gas is apparently one of those materials for which the human respiratory apparatus acquires a tolerance. Men working in the pouring rooms only casually (electricians, plumbers, etc.) are very likely to complain of the gas, while those working there regularly express surprise at the complaint. At any rate, it is a simple problem of ventilation. It has been suspected that sulfur dioxide may precipitate asthmatic attacks in certain individuals with an allergic family history. The writer's experience

bears out this impression, and it is now Dow practice to avoid placing men with personal or family histories of allergy in environments containing sulfur dioxide.

Magnesium Dust

Magnesium dust is definitely irritating to mucous membranes. The risks of fire involved in permitting magnesium dust to accumulate in the work place, however so far outweighs the importance of dust irritation that good housekeeping is enforced because of the former reason and not the latter. In the few instances where inhalation of magnesium dust is unavoidable, an approved type A respirator worn on the job will eliminate the problem.

Dust irritation is most likely to be a problem in the cleaning room where rotary files, band saw, and buffers create and disperse fine particles of magnesium. Probably for the same reasons that the metal is irritating to deep tissues, it is also irritating to mucous membranes, and there have been a few instances where irritation of the nasal mucous membrane has resulted in frequent nose bleeds. The wearing of satisfactory respiratory protection over the face has always solved this problem. Adequate ventilation will, of course, remove most of the dust.

It has been thought by some that magnesium dust should reasonably be expected to produce a dermatitis in a certain number of exposed individuals. There have been remarkably few cases of dermatitis in the writer's practice in men employed in the handling of magnesium. A few have been seen by a dermatologist, and in every instance, an offending agent other than magnesium dust has been found and the condition healed by elimination of the offending agent. In two men, biopsies of the skin were made with the full expectation of finding magnesium dust or swarf microscopically, but the pathologist to whom they were submitted failed to find magnesium present. Both cases cleared subsequently while the men were still on the same job.

The writer is well aware that this has not been the experience of some other men caring for magnesium workers who have reported to him what they consider magnesium dust dermatitis. But, the writer should like to draw attention again to the Dow practice of handling magnesium alloys practically in a dry state as a possible

explanation of the lack of dermatitis in magnesium alloy workers at Dow.

Fume Fever

When many metals are heated, the resulting oxides of the metals escaping into the atmosphere will result in a peculiar physiological reaction in people breathing these oxides. This reaction is most familiarly known as metal fever. Common examples of metals producing such a condition are zinc and nickel. Fumes arising from brass also commonly cause metal fume fever in exposed individuals.

So far as the writer has been able to determine to date, the fumes arising from magnesium do not cause any such reaction. The problem was studied a few years ago on animals by Drinker, et al.¹⁸⁻²⁰

In pouring magnesium alloy metals the operator is constantly inhaling whatever gases may arise from the molten metal. The writer has never had, in his practice, a man who thought or whom the writer thought might be suffering from metal fume fever in any degree. This may be explained in part, of course, by the fact that the molten metal is kept constantly covered by flux or with an atmosphere of sulfur dioxide. Oxides are thus prevented from forming to an appreciable extent. It is the author's impression, however, that even though formed, magnesium oxide would not be a health hazard.

In summary, the author believes it may be said that aside from its inflammable nature under certain circumstances now well understood, magnesium and its alloys are among the most innocuous materials with which workmen come in contact. Beyond question, experiments can be designed to produce disastrous results if such be the aims in view, and the same may be said of any material known, including air and water. Yet, the fact remains, that in the form and in the way in which they are used, these substances are safe and harmless. In the recovery and processing of magnesium and its alloys, certain substances and conditions are employed which are potentially hazardous, such as sulfur dioxide, fluorides in various forms, silica dust, high temperatures, etc. All of these materials and conditions, however, are familiar to industry and have been employed for many years. Properly controlled, their harmful natures can and are being circumvented completely.

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Lead-Bearing Magnesium Aluminum Alloys

IN recent years, considerable research has been carried out on the production of free-cutting aluminum-base alloys. Early difficulties experienced with these in connection with lowered corrosion resistance have now been overcome, according to an article in *Light Metals* and, for use on automatic machines particularly bar stock in this group of alloys is a material of the highest value. Little work had hitherto been done on the addition of lead to high-strength alloys, especially those containing magnesium, which have extremely high corrosion resistance.

Details given by *Light Metals* are primarily confined to the effect of lead additions on mechanical and working properties, as it is well known that aluminum-base alloys containing higher magnesium contents present some difficulties in working, being far less amenable to plastic deformation than other alloy groups, and sufficiently hard to present certain difficulties in machining.

For practical purposes alloys with 7 per cent Mg were selected because of their better ductility as compared with alloys with higher Mg contents, which would have been preferable from the point of view of securing the best free-cutting properties. Alloys of this composition and with lead contents of

0 to 2.57 per cent were prepared, extruded into rods and their mechanical properties were determined.

Addition of increasing amounts of lead was found to lower the elongation, while the effect on tensile strength and proof stress was insignificant. Even with the maximum lead content, all three were above the values specified for 7 per cent Al-Mg alloy.

The cold drawing of rods presented no special difficulties. The lead containing alloys tended to work-harden less than the 7 per cent Al alloy. Thus, for example, the latter had a tensile strength of 6.4 lb. per sq. in. (50 per cent reduction), while the lead-containing alloys (1 and 2.5 per cent Pb approximately) attain the same tensile strength only after approximately 70 per cent reduction.

The effect of annealing for 6 hr. at temperatures of 210 to 660 deg. F. on the mechanical properties and micro-structure of cold drawn alloys with approximately 1 and 2.5 per cent Pb were also studied. The difference in the lead contents had no effect on the response of the alloys to annealing. The elongation increased suddenly on annealing at 480 to 575 deg. F., while the tensile strength and proof stress of even the most severely cold-worked spec-

imens were reduced to their original values at 575 deg. Microscopic examination showed that a maximum degree of heterogeneity was obtained by annealing at 480 deg. A more uniform distribution of the secondary constituent is obtained by annealing at 575 deg., and even more so at 660 deg. It is interesting to note that although the latter temperature is above the melting point of lead (621 deg. F.) no detrimental effects were noticed.

Machining tests were made, using a turning tool and a parting tool similar in design to those used for free-cutting brass. In general, the use of the parting tool gave much more definite indications of the effect of different variables on the chip size and shape than did the turning tool.

Free-cutting properties improved with increasing lead content up to about 1.25 per cent Pb. Further additions of lead had comparatively little effect.

Increasing amounts of cold work had a detrimental effect on free-machining properties. These can be improved, in some cases even over and above those of the original material, by annealing at 390 to 480 deg. or 575 deg. F.

Surface finish obtained by machining was very satisfactory where a lubricant was used.

Surface Protection—

AMONG the various protective methods adopted in aircraft production, the electrolytic oxidation of aluminum and its alloys (this process known in Germany as eloxalation process corresponding to anodizing in the

damage than could have been expected considering the natural softness of the parent material. Although many patents have been applied for, very few processes have proved effective in practice.

The resistance of chemically pro-

tected later. The G.S. coatings are characterized by great corrosion resistance, and take on remarkably brilliant shades if subsequently colored. The process is also very favorable from the working point of view, because it is rapid and the voltage is low. All aircraft material made of aluminum and its alloys can be oxidized in the G.S. bath provided the correct current density, voltage and period of the working process are selected. Aluminum, duralumin and legal are all electrically oxidized at about the same speed.

Copper reduces the rate of growth of the oxide layer and in alloys containing copper, e.g., duralumin, it is the practice of the Dornier works to increase the voltage by a few volts so as to obtain the normal rate of growth. Hydrohalium, especially in the welded state, however, requires both a reduction in current density and periods of oxidation in the G.S. bath. The same considerations apply to every porous castings of aluminum and its alloys. It appears that prolonged exposure in the G.S. bath at excessive voltage is liable to cause pitting due to solution of the metal in the electrolyte in these cases.

All parts undergo a preliminary treatment before immersion in the eloxal bath for oxidation. After delivery from the workshop, the parts are cleaned and degreased with organic or inorganic degreasing and cleansing agents. They are then mounted, i.e., they are provided with contacts by means of aluminum or duralumin wire or other appliances made of the same materials. It must be remembered that parts lying flat on top of each



FIG. 1.—A simple way of securing work for anodizing by gripping it between the coils of two duralumin springs. This can be done quickly, the components are held very securely and the contact area is small.

U. S.) has increased in importance. It is well known that under the action of the oxygen in the air, aluminum becomes coated with a very thin layer of oxide, which is a strong deterrent to further inroads of oxygen on the metal. This natural layer of oxide is a mere film, but its protective properties are so great that it allows aluminum to be used as an aircraft material. This discovery led to experiments for increasing the thickness of the natural layer of oxide by chemical or electro-chemical means with a view to improving the protection against corrosion still further. At the same time, owing to this artificial layer of oxide (hardness 7-9 on the Moss scale) the aluminum becomes much more resistant to mechanical

duced oxide coatings is strictly limited, according to an article from *Die Dornier Post*, translated by *Aircraft Production*. Conditions are, however, different in the case of electrolytic oxidation of aluminum when, provided the electrolytic, electric current and temperature are correctly chosen, more or less elastic absorbent as well as corrosion resistant coatings are obtained.

The G.S. process (Gleichstrom Schwefelsäure, i.e., continuous current sulphuric acid process) was introduced in aircraft construction where corrosion resistance and hard coatings are important. The G.X.H. (continuous current-oxalic acid process) was used for the production of "Seo Foto" plates, men-

**Fifty-fifth in a series
of articles on the technical and commercial aspects of metal finishing and cleaning.**

Light Metals . . .

other are not coated at the point of contact, either because the parts are not uniformly wetted by the bath or because the amount of deposition is insufficient. It is therefore necessary for the electrical contacts to be as small as possible and yet sufficiently large to prevent the current density of 1.5 to 2 amp. per sq. dm. from causing excessive heating and consequent burning of the material. If suitable attachment devices are used which provide firm electrical contact and do not interfere with the flow of the current, excessive heating will be avoided and perfect eloxalation assured for sheets of any size and thickness. It should also be borne in mind when fitting the contacts that there is considerable evolution of oxygen and hydrogen during oxidation. These gases must not be trapped in cavities in the material because the electrolyte would then be expelled from these regions and as a result cooling would take place on one side only and the resultant overheating would cause corrosion. Care must, therefore, be taken that in the case of hollow spaces, as in containers, the opening faces upwards.

Hollow Parts

Although the deposition power of the eloxal bath is very great in comparison with other galvanic baths, it is not great enough to thoroughly eloxate the inside of long pipes and large tanks. The depth to which the deposit penetrates is 20 times the diameter of the apertures. Work-pieces in which the hollow space is deeper or greater must be fitted with auxiliary cathodes, care being taken that these are properly insulated with respect to the material undergoing treatment. After the parts have been mounted they are pickled in a mixture of hydrofluoric and nitric acid. This removes any remaining dirt, as well as the natural coating of oxide due to oxygen in the air. The pickling is completed as soon as the surface of the specimen becomes a pure white. After rinsing in cold water, the parts

... German data on the electrolytic oxidation of aluminum alloys for aircraft components are presented here. Not only can this process be used for protective coatings, but for the detection of cracks and inclusions as well.

are suspended in the eloxal bath and the contacts provided on the mounting screwed up with the anode. The thickness and quality of the oxide coatings produced in the bath depend on the temperature and duration of immersion, voltage, current density, as well as on the concentration of the bath. The greatest possible uniformity can only be obtained by accurate control.

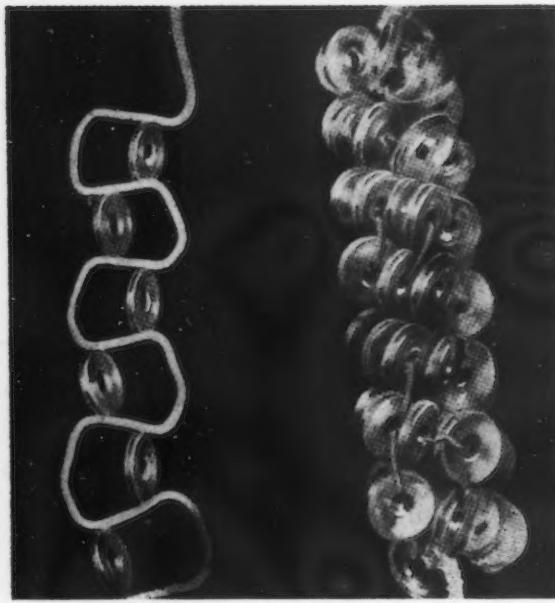
Bath Details

The concentration of the bath is determined by titration—a common chemical method. The difference between the free and combined acids thus observed provides exact data concerning the aluminum dissolved in the bath in the form of sulphate. Since a rise in the sulphate content increases the resistance of the electrolyte, it must be balanced by an increase in the voltage. If, however, the alu-

minum sulphate increases beyond 6 oz. per gal. it can no longer be compensated by voltage rise, and the electrolyte becomes unfit for use and a fresh solution is necessary. If titration shows that the bath concentration is too low, concentrated sulphuric acid must be added. The bath temperature, which should be between 60 and 70 deg. F., is next measured, and the current switched on. The voltage used in this case varies between 11 and 22 volts. The voltage required to insure in 20 min. a coating 0.0004 to 0.0005 in. thick is obtained from a table compiled at the Dornier works, which takes



FIG. 2—The use of a single spring for holding small parts in the anodizing bath.



into account the nature of the specimen, the concentration of the bath and the temperature of the electrolyte.

The temperature of the electrolyte during the eloxalation period is maintained at the value fixed at the beginning of oxidation by means of cooling water flowing through aluminium pipes. When, owing to the temperature of the cooling water being too high, this is not possible, the bath voltage must be reduced in proportion to the rise in temperature. The current is disconnected when the oxidation process is completed. To prevent the electrolyte from destroying the oxide layer, the specimen must be removed from the bath as quickly as possible and well rinsed in running water (cooling water of the eloxal bath) until the acid is completely removed from the pores of the coating of oxide. This occupies 10 to 20 min., and is followed by a working process, during which the corrosion resistance of the layer of oxide is considerably increased by sealing the pores in a hot potassium bichromate solution, followed by the application of a varnish.

The familiar yellowish-green coloring of the layer of oxide is produced in the hot potassium bichromate. The pores are closed by a temperature of 195 to 205 deg. F. Since only the oxide coating is colored and the metal remains colorless, the coloring acts also as evidence of satisfactory eloxalation. In spite of the sealing effected by the potassium bichromate bath, the layer of oxide retains a small degree of absorption. Fats

especially penetrate into the layer of oxide and are very difficult to remove, and consequently they endanger the adhesiveness of any subsequent painting. In order to eliminate this danger, after sealing and drying, all specimens requiring painting are first immersed in dipping-varnish. This varnish, being very thin (7 to 11 oz. content of solid matter per gal.), penetrates well into the coating and, after drying, leaves a very thin film which cannot be scraped off. When the

pipes with a thickness of 4 x 1, 6 x 1, 8 x 1, and partly also 10 x 1, can be eloxalated and provided with requisite identification marks as straight pieces. There is no reason to fear that the varnish will crack when the specimen is subjected to further cold working, as was formerly the case when a coating of paint was applied. Pipes of a larger diameter and such as are worked hot can only be eloxalated and dyed after the shaping process is completed, and there is danger of the coloring burning off.

Mention has been made earlier to the G.X.H. process, which is used for the production of highly absorbent and corrosion resistant layers. This coating of oxide is produced in 40 min. on aluminium of the highest purity using an electrolyte consisting mainly of

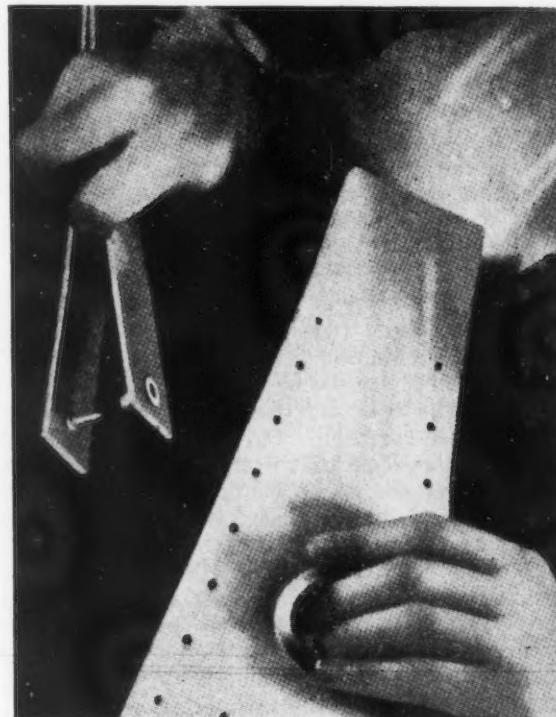
ABOVE

FIG. 3—On the left is seen the standard method for securing small pulleys, the more economical Dornier method being shown on the right.

• • •

RIGHT

FIG. 4—Contact with sheet metal parts is made by a spring clip with a tapered pin and socket at the ends. Presumably, the pin is inserted in a hole of smaller diameter and makes contact by the taper.



final coating of paint is applied, the film of varnish is redissolved and forms a firm anchor for the paint.

Colored Finishes

As already mentioned, layers of oxide can be colored, and this property is useful as a means of identifying pipelines in aircraft. Thus, if after electric oxidation, these components are placed in an aqueous solution of an aniline dye, they will take on a hue which is in a great measure petrol, oil and water resistant. Provided they are cold-shaped at the time of the installa-

tion, pipes with a thickness of 4 x 1, 6 x 1, 8 x 1, and partly also 10 x 1, can be eloxalated and provided with requisite identification marks as straight pieces. There is no reason to fear that the varnish will crack when the specimen is subjected to further cold working, as was formerly the case when a coating of paint was applied. Pipes of a larger diameter and such as are worked hot can only be eloxalated and dyed after the shaping process is completed, and there is danger of the coloring burning off.

oxalic acid, with a current of 30 to 35 volts. The electrolyte must have a temperature of 95 to 104 deg. F., and the current density should amount to 1.5-2 amps. per dm². The strong absorption of the layer is used, according to a Siemens' patent known under the name "Seo-Foto," for the deposition of photo-sensitive substances. The subsequent treatment of such layers is similar to the photographic process, and is used for the manufacture of highly corrosion and heat-resistant sign plates. These color plates do not fade, and, owing to

the hardness of the oxide coating, possess a very high abrasion resistance. Half-tone photographs can also be produced by this method. Seo-Foto plates can be of any shade.

Surface Structure

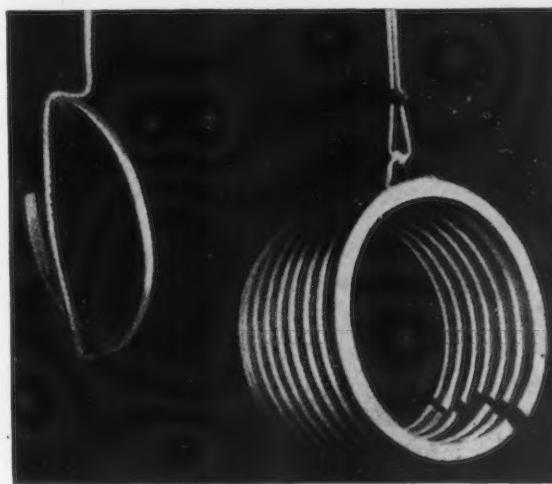
The reason for the success of the eloxal process is that in the electric oxidation of aluminium and its alloys no foreign metal is deposited onto the metal as in other galvanic processes; the coating of oxide is formed from the actual metal itself combining with the oxygen produced on the surface. A magnified oxide section through a coating of the oxide shows that the oxide is not formed as a compact layer but is permeated by tiny pores reaching right down to the basic metal. It is this porosity which only makes possible the deposition of thicker layers. Through these pores the electrolyte penetrates again and again to the basic metal where, in conjunction with the current, it promotes the further growth of the layer. The electrolyte slowly dissolves the oxide, and this goes on even during the process of oxidation. The coating of oxide grows more slowly as its thickness increases, with the result that, after a certain thickness is reached, the old layer is dissolved and replaced by a new one. It is therefore impossible to produce layers of arbitrary thickness. For the process as applied to aircraft materials the maximum thickness is approximately 0.001 in. mm. This, however, has the advantage that thin cover sheets cannot be completely converted into oxide if the instructions are observed. Two-thirds of the oxide layer is formed inside the basic metal, *i.e.*, by inward growth, and one-third of its thickness is above the surface. The specified dimensions of the material are therefore not strictly retained, but,

so far, this has not proved detrimental. Small variations in the measurements are due to the porosity of the layer.

The electric disruptive strength of the oxide coating is very great, and in a layer 0.0006 in. mm. thick it amounts to 160 volts. This circumstance would be detrimental to

Oxide layers are stable up to about 3650 deg. F., *i.e.*, almost four times higher than the melting point of aluminium itself. Thus, the welder is wasting his time if he tries to weld eloxalated materials. When heated with the torch the metal certainly liquefies, but the oxide remains as a compact layer,

FIG. 5—Previously these rings were held singly, but they are now anodized in batches.

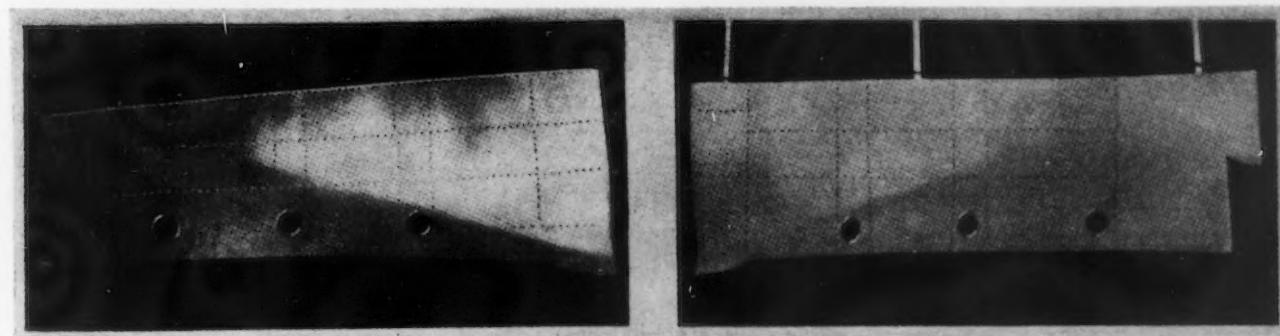


the radio equipment in aircraft if it were not possible to bond all the structural components of an aircraft. A perfect electric connection is established, however, by the rivets and screws, and also because all bore-holes on eloxalated parts are made before assembly, or are redrilled. The oxide layer is also made use of in the electrical industry as an insulating agent for aluminium wires instead of the rubber varnish, etc., hitherto employed. The insulating action of the oxide coatings is also used in the inspection of treated parts. With the aid of a torch battery and bulb, it is quite easy to check whether the specimen is thoroughly eloxalated all over or whether there are flaws in the coating.

and prevents the formation of a perfect welding seam. Welded parts which have already been eloxalated and require rewelding must, therefore, first be de-oxalated. This operation is carried out in a hot caustic soda bath or in a nitric-fluoride acid pickling bath. Such re-welding may become necessary, because the first eloxalation often shows up cracks which were not noticed before.

Detection of Flaws

In general, electric oxidation of aluminium and its alloys shows up cracks and inclusions in the material both after the preliminary pickling or during the actual oxidation itself, since foreign bodies are dissolved at the anode.



FIGS. 6 & 7—The earlier method (left) of suspending large sheets by means of aluminum wire which cannot be used again has been replaced by a new method (right) which employs special hooks. These may be used approximately 200 times.

Defects of this type discovered after eloxalation include, for instance, cracks on flanged and filed parts (due to overstressing) besides defects in the rolling, inclusions and cracks which were present in the material already before fabrication. It is also possible to detect faults in the material due to overheating. As it frequently happens that such cracks and flaws in the material do not become visible until after eloxalation, this process is applied even to the unfabricated material in the case of expensive work requiring milling, shaping and turning. By this "preliminary eloxalation" it is possible to detect faults in the material which otherwise would only be found after difficult investigations, and insure that only high-grade material is assembled and installed in the aircraft. Machining on an extensive scale should not be carried out on specimens which have already been eloxalated unless re-oxalation is possible. Fabrication of eloxalated parts by pressing, hammering, rolling, etc., is only permissible if the

work can be carried out without annealing and subsequent heat-treatment. Eloxalated specimens requiring annealing must first be de-oxalated. The heating in the annealing bath expands the material, the oxide layer is cracked and this interferes with the contraction of the material on cooling. Thus permanent elongation up to $\frac{1}{2}$ per cent have been noted after annealing eloxalated material.

The most important use of the oxide layer is protection against corrosion. Only a few years ago, before the eloxal process had been introduced for aircraft construction, lacquering was the only known protection against corrosion. It became, however, a fairly costly operation, quite apart from the appreciable increase in the weight of the aircraft. According to the particular process adopted, lacquering also takes time, quite apart from the time spent on cleansing, degreasing and spraying. In this respect the eloxal process made a fundamental change. A specimen

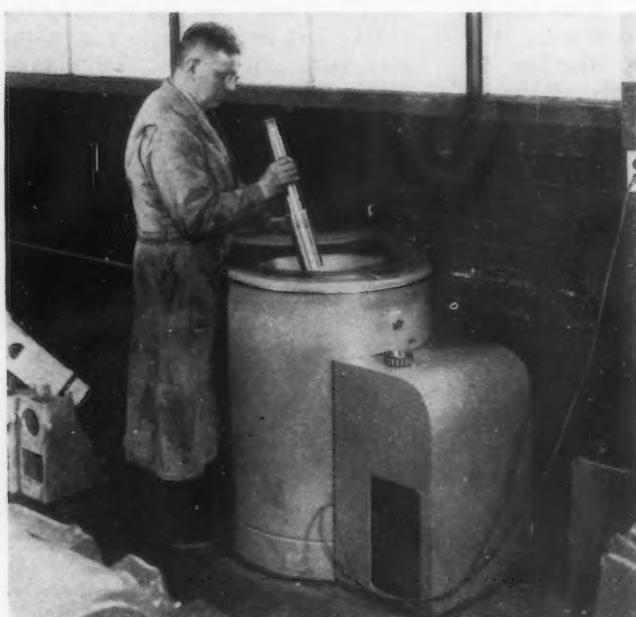
can be eloxalated in $1\frac{1}{2}$ hr., and during this time protection against corrosion equal to three layers of lacquer is already obtained. The specimen can be riveted immediately after eloxalation, and there is no danger of the oxide cracking at the rivet points as formerly happened with some lacquers. After assembly, a single coating of paint is applied to provide camouflage, recognition marks, and protection for the rivets. Owing to the presence of the oxide layer, this final coating adheres very strongly.

The cost of eloxalation has been considerably reduced by the improvements made at the Dornier works both to the eloxal process itself as well as to the method of suspension in the bath. At the present time the cost amounts, at the utmost, to one-quarter of that of a three-layer lacquer coating. Thus the eloxal process ensures greater corrosion resistance, considerable saving in time, reduction in weight and cost of aircraft maintenance.

Chilling Prevents Bearing Surface Damage

LOW-TEMPERATURE chilling equipment is being used by prominent machine tool builders to shrink spindles for machine tools so that bearings may be assembled

on the spindles without marring or damaging the surface and without running the risk of damaging the bearing by hammering it during assembly.



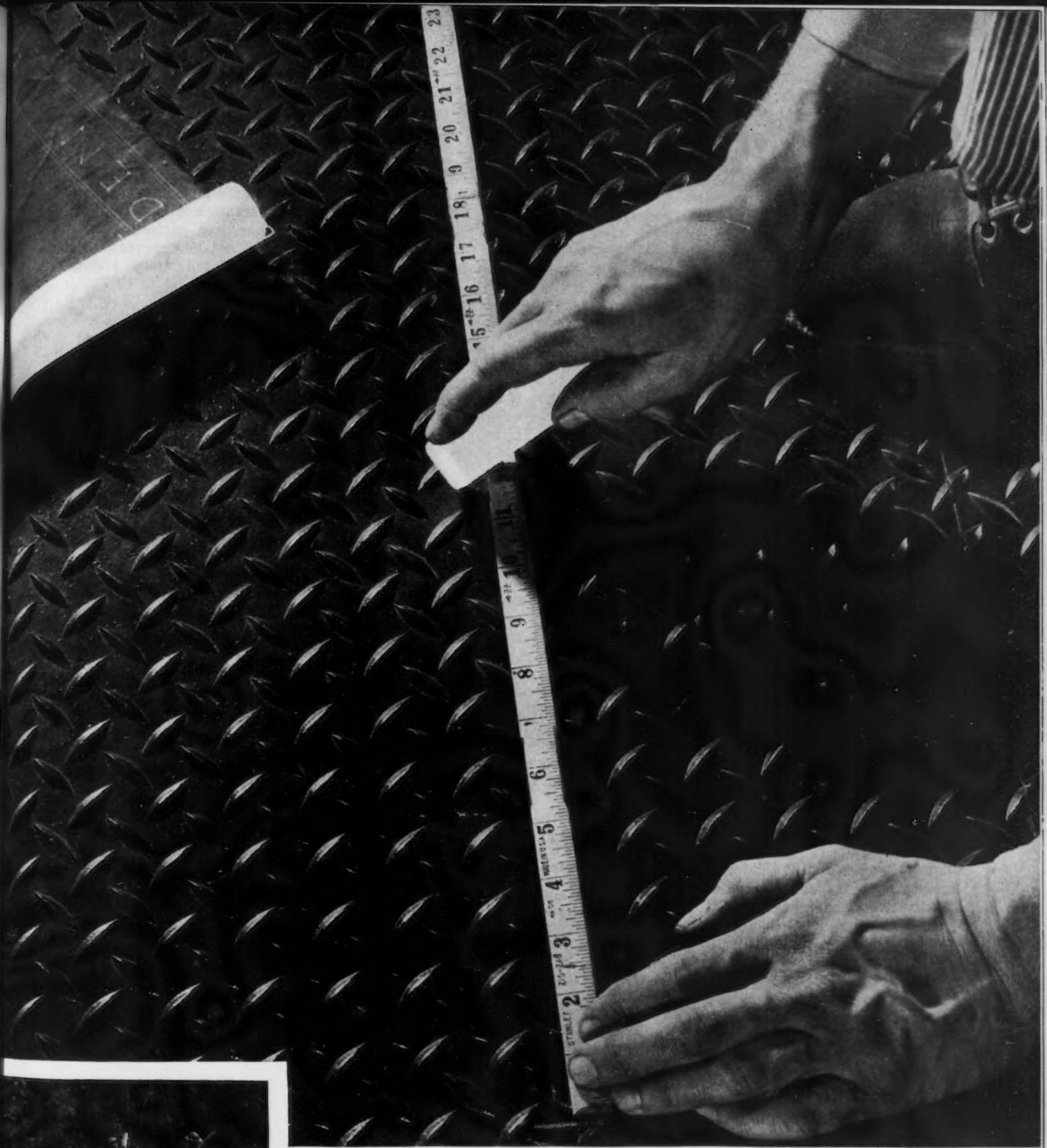
THIS bearing shoulder on shaft will be shrunk 0.001 to 0.0015 in. in 40 min. in a portable low-temperature chilling unit developed by the Deepfreeze division of Motor Products Corp.

The bearing shoulder on the shaft shown in the accompanying photograph is 2 in. in diameter and is shrunk 0.001 to 0.0015 in. in 40 min. by chilling to -50 deg. in the chilling unit shown in the illustration. This portable unit was developed by the Deepfreeze division of Motor Products Corp., North Chicago, Ill. These chillers are made in two sizes for industrial applications; one for temperatures from -40 to -50 deg. and a second for cycles to -120 deg. and lower.

• • •

• • •

These chilling units are also being used for shrinking steel sleeve-type bearings for inserting into a cast iron housing which is used for supporting and guiding spindles for boring machines. The bearings are made 0.005 in. oversize, or larger than the bore in the housing. They are then shrunk, about 0.001 in., by chilling, and are assembled in the housing. When the completed assembly returns to room temperature, the bearings expand to an accurate and tight fit.



Keep both of them on the job . . . The man on the firing line joins the man on the production line in looking to "A. W." Rolled Steel Floor Plate for skid-proof protection against costly disabilities. Diamond-shape projections give maximum traction. No worn or slippery surfaces. Easy to clean, quick to drain. No maintenance expense—"A.W." Floor Plate is safe permanently.

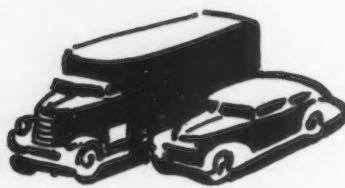
ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS: CONSHOHOCKEN, PA. District Offices and Representatives: Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, St. Paul, New Orleans, Pittsburgh, Roanoke, Sanford, N. C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal.

Courtesy U. S. Army
Signal Corps

Assembly Line . . .

• **Tank cutbacks suggest massed tank onslaught developed by Nazis may now be outdated . . . Output far exceeding expectations may reduce number of plants producing ammunition.**



DETROIT—The outlines of the reshuffling of war production, described broadly in last week's "assembly line" and "industrial week" summaries, are coming up more sharply, like lines appearing on a photograph in the developing bath.

One overall hypothesis on the shifting was brought out last week by C. E. Wilson, president of General Motors, who said the whole pattern seemed to him to have grown out of a shifting from defensive to offensive weapons.

This viewpoint is logical, even though there are exceptions to be registered to the general observation. For other factors obviously enter in, even though they may be less significant than the changed attitude on how to wage the war.

Cutbacks ordered thus far by Washington mainly affect plants producing anti-aircraft guns, tanks, trucks, and—probably to be formally ordered soon—ammunition. The increases which counterbalance these reductions are mainly in aircraft.

CERTAINLY the anti-aircraft gun is the very epitome of defensive thinking. In this category substantial reductions have taken place. In fact, this cutback is so broad that it becomes possible that one brand-new development in the field, barely out of the engineering stage, may now not see the light of day at all during this war, unless a new need arises for anti-

aircraft protection beyond that now envisioned.

Tank output, also has been pared down considerably. It can be estimated that forthcoming tank output will be lower by a large fraction than was projected earlier. This cut is spread across the board, affecting all producers about equally, and it stems from a number of causes.

In the first place, there are materials shortages which act to hold up output. In the second place, there is lack of shipping space. These two reasons account for backlogs of nearly completed and completed tanks awaiting movement from depots throughout the country.

BEYOND that, however, is some belief that a reconsideration of the entire tank picture may be in prospect. After all, the massed tank onslaught is essentially a German development. When it proved so successful in the fighting leading to the fall of France, it seemed an unbeatable talisman for success. But the land minefield has slowed up tank movement on both sides. And American developments such

as the armed scout car and the jeep have proved themselves as neutralizing agents against tanks, at the same time that they set up new standards for mechanized speed. It may be significant that while tank output has been curtailed, the production of smaller armed vehicles, as differentiated from transport units, is understood to be continuing unimpeded.

As earlier reported, cargo carrier aircraft output was chopped off before it even reached production stage. Here the shifting from defensive to offensive thinking is well exemplified. The cargo carrying plane is essentially defensive, a contrivance to evade surface level obstacles.

SO much for the shape and character of the cutbacks. They do not have serious ramifications in what was once the automobile industry, for the companies radiating out of Detroit were in the main tuned up to output on aircraft, rather than on other material. Chrysler may be an exception to this broad conclusion, its tank and gun program may overbalance its aircraft work. But in General Motors the division between aircraft and non-aircraft (and much of the non-aircraft procurement has not been reduced) is about 50-50. In

ZULU INFLUENCE: With so much of the war being fought in the South Seas it is no wonder that welders of North American Aviation, Inc., have adopted Zulu motifs for decoration of their welding masks. Actually, these decorated masks serve to remind all who approach that these men are casting an evil spell over the Axis with their work. Even Hitler's flyers would probably admit it.

Acme Photo



Tool Conservation begins in the Tool Crib

*Know Where
ALL YOUR
TOOLS
are ALL
THE TIME!*



This wide window ledge, chest high, provides a convenient writing space and under it ample easy-to-get-at storage space for frequently used items.



No time is lost accounting for this reamer. The attendant hands it over to the operator in exchange for a requisition.

A PRACTICAL tool accounting system saves tools, time and money. One simple but highly effective method is illustrated here. Machine operators make out their requisitions on wide ledges or counters. When the tool is issued the requisition is hung on the "Out-Tool" board under the operator's own special number. It stays there until the tool is returned. This is a simple system, but highly efficient and speedy in practice.

Another proven practical plan is to exchange the tool for a metal tool check with the operator's number on it.

After all, the exact system used is less important than knowing where tools are and being able to issue them quickly. Wasting time at the tool crib window means lost time at the machine. These days America can not afford wasted time!

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASSACHUSETTS
DETROIT PLANT: 5850 Second Boulevard
WAREHOUSES in New York, Chicago and Los Angeles
In Canada: GREENFIELD TAP AND DIE CORP. OF CANADA LTD., GALT, ONT.



Photos Courtesy General Electric Co. of Philadelphia

ON THE ASSEMBLY LINE

Ford, it is dominantly aircraft. Studebaker, Nash and Packard are almost exclusively preoccupied with aircraft procurement. Hudson and Willys are less so, but are engaged in other fields which appear slated to hold up well.

One net effect of the switching of war production plans will be to slow up the hiring of men in the critical Detroit area. Some breathing space will be afforded, and quite likely the overall employment total will not quite reach the 750,000-odd level anticipated earlier. Illustrative of the trend is the fact that where General Motors expected to hire some 16,000 more men in October, it actually took on but 10,563. And actual layoffs within General Motors are now seen as no more than 1000 men or so, barely perceptible against today's record-high payroll total of 273,112 hourly rated men.

ABREATHING spell will also be afforded companies which are still tooling up jobs and preparing to tool others. The pressure is definitely reduced on many of these.

Mention was made earlier of ammunition output. It is likely to be curtailed, simply because production has been so far ahead of anticipations of producers and military officers alike. Perhaps 100 or more concerns now making ammunition may be removed from the production list in this category when their contracts run out soon.

Output of shells has developed far beyond the point generally realized. Take, for example, the scope of the Oldsmobile division of General Motors, which has become one of the largest producers of shells and automatic cannon in the entire war production program.

It is not generally known that Olds has expanded its shell operations beyond the plants which have been working on those jobs in Michigan. Olds has taken over operation of the erstwhile Chevrolet-Fisher units at two midwestern points, and these plants are in full operation.

THE equipping of these plants was a round-up job in both instances, inasmuch as they were designed for Chevrolet assembly work, with a very minimum of machining facilities. Contracts to operate them came early this year, when machinery ordering was piled high in suppliers' books, and so a

variety of expedients had to be resorted to, in order to start production rapidly.

Equipment was salvaged in some instances from discarded facilities of other producers, and then rebuilt to the newly required specifications. Gas-fired furnaces had to be employed, and drop forging was the only quickly available means of fabrication. These methods contrasted with the high frequency electric furnaces and the upset forging utilized in Michigan.

One of the outlying plants was equipped with several hammers for 90 mm. shells and for 74 mm. shells, plus requisite accessory equipment for forging. At the other plant a battery of hammers was set up for work on 105 mm. H.E. shells, and other facilities were set up for production of armor piercing shot. In both plants, of course, a wide variety of additional machinery was installed—mainly standard specification lathes, grinders, milling machines and welding equipment.

AT both plants forge operations were laid out in the new car conditioning plants of the Chevrolet operations. These plants were rebuilt, with furnaces and hammers installed in the space formerly utilized for inspection pits. The machine work in both instances was set up in Fisher factory space, where conveyor lines, sheet metal working facilities, spray booths, trim and glass departments had to be torn out.

The operation of these two plants represents somewhat of a tribute to Olds and its parent program in Michigan. The shell-making job of this producer began in the fall of 1940, and proved so successful that when we entered the war Ordnance asked the division to undertake similar work outside of the Detroit Ordnance District, thus paving the way for absorption of the outlying Chevrolet-Fisher space.

Olds is equally well thought of in ordnance circles for its work on guns. It now manufactures 20 mm. and 37 mm. automatic aircraft cannon and 75 mm. tank cannon.

Some NE steel specifications are now beginning to be employed in the manufacture of the 20 mm. rapid-fire gun. Interesting, too, is the fact that some less highly stressed parts are now being made of Armasteel, produced by General

Motors Malleable Iron Division.

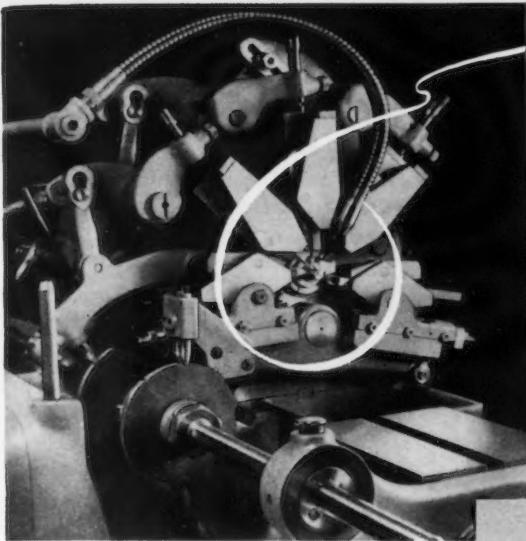
These guns are produced with some parts within .0002 in. tolerance, and required large-scale training for erstwhile automotive workers before they could qualify to go onto such work. The training program proceeded rapidly, however, and employment in the Michigan plant has been about a fourth larger than ever before in that plant's history. Payrolls at the outside plants also were above previous levels registered by the Chevrolet-Fisher operations. Work schedules at all points comprise three 8-hour shifts, most departments working six days a week, with seven-day work effective in specialized departments.

ANNUAL savings of a million pounds of high grade steel and many thousands of hours of machine time are estimated by Timken-Detroit Axle Co. to have been accomplished by a new method developed for making differential pinions.

Details of the new Timken process are partially restricted but it can be said that the process results from use of a modern type of forging machine, a new approach to the die problem and a new sequence of forging, cleaning, trimming and normalizing operations. The pinions produced are so perfect in detail that only three machining operations are necessary to finish them after they come off the forging machine—boring a hole for the differential trunion, chamfering the hole and finishing the back face of the pinion. The teeth require no machining whatsoever.

On top of those advantages, the forging operations produce a denser, harder metal structure, accompanied by increased strength. The weight, accordingly, is slightly larger than that of differential pinions produced in orthodox manner but this added weight is far outbalanced by the savings in bar stock required for the forging. In one size, a piece of bar stock required in the old process weighed 4.77 lbs.; it is now replaced by a piece of stock weighing 2.12 lb.

Special gear cutting machines were formerly required to produce these differential pinions and their special tooth form. Now, however, the forging process results in the same finished dimension and develops the same accuracy as was obtained from gear cutting.



**A Principal Reason For The
HIGH FINISH
EXTREME ACCURACY
UNVARYING CONCENTRICITY**

Produced By This Machine

Shown above is a part typical of those produced on the Wickman High Precision Automatic. To secure the various diameters, undercuts and cut-off, five individually cam-fed single point tools are employed. The sliding headstock is also operated by a cam and controls the various lengths. Identified by number on the line drawing of the completed part, and in cutting position in the drawings at the right, are the tools used to perform each operation.

It is to be noted that, in producing this part, the tools are supported very close to the contact point. At no time is it ever necessary for the cutting tools to operate further than $1/32''$ from the guide bushing.

All tool holders are provided with both radial and lateral micrometer adjustments. The collet capacity is up to $1/2''$ diameter, and maximum turning length is $4'$. 28 spindle speeds up to 7000 R.P.M. and infinite feed rates are available. Attachments for drilling, threading, tapping and slotting can be supplied as standard accessories.

A NEW EIGHT PAGE BOOKLET, COMPLETELY DESCRIPTIVE OF THE OPERATION AND CONSTRUCTION OF THIS MACHINE, IS JUST OFF THE PRESS. WRITE FOR IT.

SPECIFICATIONS OF PART SHOWN

Part - 3-27/64" long—ten diameters between $5/32''$ and $23/64''$ —three undercuts.

Material—Stainless steel—Black and Red.

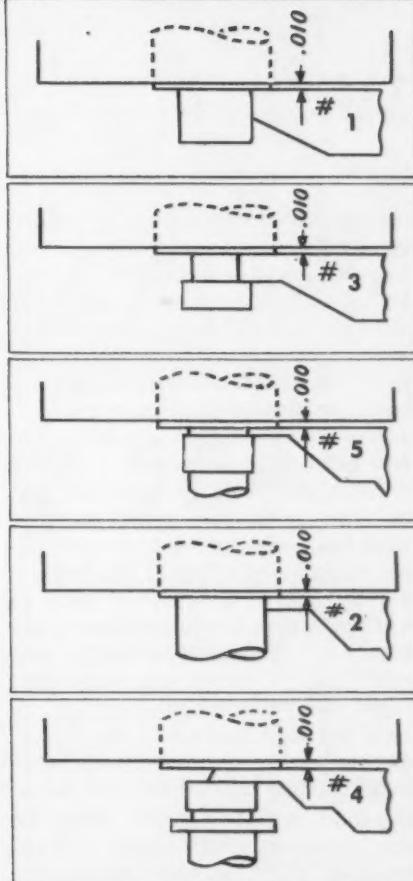
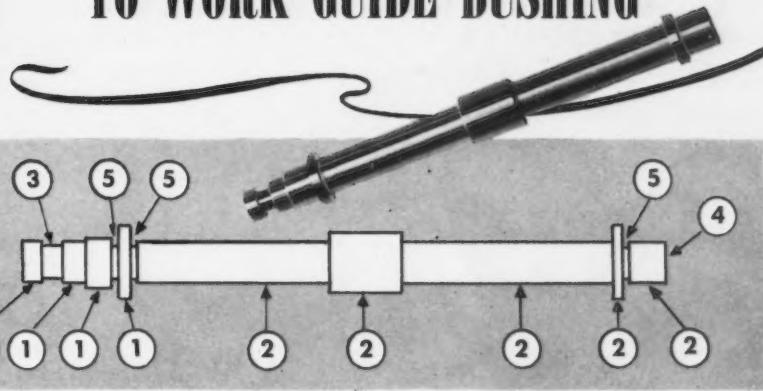
Production—Approx. 12 pieces per hour.

Tolerance— $\pm .0005''$ on all diameters.

Finish—25 to 30 Micro-inches.

Five Individually Cam-Fed Tools

OPERATING EXTREMELY CLOSE TO WORK GUIDE BUSHING



WICKMAN HIGH PRECISION AUTOMATIC

(SWISS TYPE)

THE
Wickman
CORPORATION

15537 WOODROW WILSON AVE.

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In Canada: A. C. Wickman, Ltd., Toronto—West Coast: Moore Machinery Co., Los Angeles, San Francisco—Branch Offices: Chicago—Hartford.

Washington . . .

• Appraisal of government restrictions on metals in 1942 shows large tonnages saved
... Civilian and indirect military consumption of steel in 1942 estimated at 27,800,000 tons.



WASHINGTON — An appraisal of the results of government restrictions on steel, copper, aluminum and rubber in 1942, made by THE IRON AGE, shows that the agencies have done an effective job in cutting down non-essential uses of these materials. The figures used in the study were obtained from government sources, but common to all statistical examinations of so broad a scope, estimates have been made in cases where definite information was not readily securable.

Estimated civilian and indirect military consumption of steel in 1942 has been put at 27,800,000 ingot tons. When the 67,000,000 ingot-ton output for 1940 is used as a comparison point, 1940 being the last year in which military consumption of steel was relatively negligible, theoretical savings in 1942 through restricted use by industry and government amounted to 39,200,000 tons or 58 per cent of the total output in 1940. Based on the increased 1942 output it is estimated that between 59,000,000 and 60,000,000 tons of steel will be available this year for direct military requirements. Savings are said to be theoretical because the metal was consumed by war needs.

ACCORDING to Leon Henderson, Director of the WPB Civilian Supply Division, a mere 1½ per cent of 1943 production of steel will be devoted to civilian needs. Pred-

icated upon an estimate of a possible 90,000,000 ton output next year, civilians may look forward to a 1,350,000 tons of steel goods, according to Mr. Henderson. By the same token, if 1943 tonnage allotted for indirect military use remains the same as in the present year, 26,450,000 net tons of steel will be devoted to these purposes. However, tonnage for indirect military use may climb, as for example, it is being predicted with respect to the railroads and other transpor-

tation units, such as pipelines and other large consumers.

Savings in copper, aluminum and rubber in 1942, when computed as in the case of steel, were respectively, 49 per cent or 437,400 net tons, 80 per cent or 243,050 net tons and 84 per cent or 757,800 net tons. Estimated 1942 civilian and indirect military use was as follows: Copper, 458,200 net tons; aluminum, 60,500 net tons; rubber, 142,000 net tons. Production in the base year 1940 was: Copper, 895,-

Typical Conservation Resulting in Savings of Selected Materials
(In Net Tons)

ITEM	Steel	Copper	Primary Aluminum	Rubber	Nature of Change
Review of construction projects.....	400,000	30,000	200	3,000	Specification changes
Fencing, railroad, poultry, etc.....	150,000				Specification changes
Steel drums, gasoline, paint, soap.....	17,000				Specification changes
Terneplate.....	13,000				Revocation of Order M-81-h permitting use in oil cans
Victory stoves for 240,000 defense homes.....	9,600				Specification changes
R. F. D. mail boxes.....	5,000				Specification changes
Closures.....	3,000				Substituted plastics
Latex cups for collecting rubber.....	3,000				Specification changes
Fuses, electrical.....	-1,000		1,200		Substituted steel
Incandescent lamps.....	650				Specification changes
Containers, dynamite, beverage bottles.....	600				Specification changes
Office paper punches.....	500				Specification changes
Culvert pipe:					
Burns City Ordnance Plant.....	395				Specification changes
Camp McCoy.....	200				Specification changes
Visible record equipment tabs.....	275				Specification changes
Flood lamps and airport lighting.....	-250		150	250	Substituted steel
Delaware aqueduct.....	-150		3		Substituted steel
Gas range thermostatic controls.....	150				Specification changes
Nails.....	-80		80		Substituted steel
Steel culverts.....	34				Denial of appeal
Drain pans for ice boxes in defense housing.....	32				Substituted glass
Bar and strip steel.....	17				Denial of appeal for use in mop wringers
Black sheet steel.....	6				Diverted from calendar edgings to essential bottle caps
Outlet boxes for holding and reconsignment depots.....	5				Substituted ceramic boxes
Fluorescent lighting fixtures.....	4				Substituted non-metallic reflectors
Blasting sleeves for sandblasting propellers.....	2				Substituted glass
Bronze alloys for industrial use.....		24,000			Specification changes
Reinforced conductors:					
Bonneville—Grand Coulee.....	5,600		5,600		Specification changes
Wire screen cloth.....	60				Specification changes
Padlocks.....	70				Specification changes
Metal Containers.....	NA				Substituted fiber boxes
Staples.....	NA				Partly elimination, partly reduction of size of stitching wire
Structural steel for buildings.....	(a)				Specification changes
Reinforced concrete steel.....	(b)				Specification changes
Mill buildings, steel requirements.....	(c)				Specification changes
Tires and tubes (Firestone Co.).....				10,000	Specification changes
Fire hose, cotton, rubber lined.....				2,500	Specification changes
Insulated wire and cable.....				2,400	Specification changes
Automobile and motorcycle inner tubes.....				1,500	Specification changes
Rubber closures.....				300	Specification changes
Rubber covered rolls.....				150	Specification changes
Pump tanks.....		7,500		7,200	Specification changes
Extinguishers (Soda acid).....		2,850			Specification changes
Stirrup pumps.....		2,100		2,500	Specification changes
Hose couplings and fittings.....		1,150			Specification changes
Extinguishers (Foam).....		175			Specification changes
Total.....	604,800 -1,480	74,808 -5,600			
Total.....	603,320	69,208	6,050	29,550	

(a) Quantity not determinable—estimated savings 10 per cent of steel required per unit.
(b) Quantity not determinable—estimated savings 25 per cent of steel required per unit.
(c) Quantity not determinable—estimated savings 20 per cent of steel required per unit.

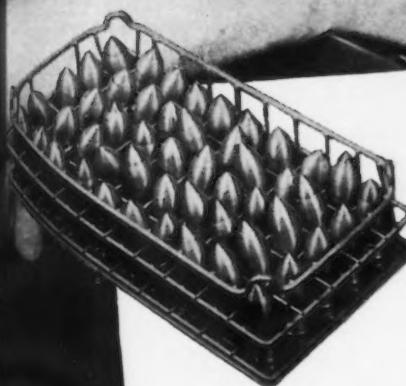
NA (Not available).
— (Minus sign prefixed to figures shows substituted use where savings in one material resulted in consumption of another.)

A.P. SHELLS-260 MORE PER TOOL GRIND!



SUNICUT 209

"BOOSTS 37MM. SHELL PRODUCTION"



Production of 37mm. armor-piercing shells at this metal-working plant was hindered by short tool life . . . until a Sun Doctor of Industry diagnosed the trouble and recommended a change in cutting fluid — to Sunicut 209.

On the circular forming operation Sunicut 209 increased tool life by more than five times! On other operations it likewise effected a substantial improvement.

Another advantage of Sunicut 209 that oper-

ators were quick to appreciate was its transparency — permitting a clear view of tools and work at all times, easy micrometer readings, greater accuracy, fewer rejects.

Sun Engineers and Sunicut have been rendering production-boosting service like this since long before Pearl Harbor. Today . . . in your own plant . . . whatever your metal-working problem . . . they can help you. For helpful examples of how they are helping others, write for your copy of the booklet "Helping Industry Help America."

SUN OIL COMPANY • Philadelphia

Sun Oil Company, Ltd., Toronto



SUN PETROLEUM PRODUCTS

HELPING INDUSTRY HELP AMERICA



FOR WAR BONDS
AND STAMPS

WASHINGTON NEWS

600 net tons; aluminum, 303,550 and rubber 899,800. Since rubber supplies have been cut off, the latter figure is not indicative of rubber available in 1942 for essential needs.

MORE than 37,500 tons of primary aluminum have been conserved through segregation of scrap. Figures for savings through segregation of scrap in steel, copper and rubber were not available, at the time of compilation. Approximately 17,000 tons of aluminum and 78,000 tons of copper have been conserved through the freezing of inventories. Figures for steel and rubber with respect to savings through freezing have not been thus far ascertainable.

Material conservation has been aided by the efforts of the WPB Material Division, Conservation Division and the Salvage Branch. The National Bureau of Standards has been making specification, standardization and product simplification recommendations for more than 20 years. Naturally, WPB was glad to get the cooperation of men of such long experience to guide them in the issuance of limitation and conservation orders. The armed forces have made specification and

**Typical Metal Savings by WPB Restrictive Orders
(In Net Tons)**

ITEM	Steel	Copper	Rubber	Order Number
Cans—Blackplate.....	64,000	.....	.....	M-136
Domestic cook stoves.....	54,688	495	1,171	L-23-c
Bicycles.....	36,630	.....	.....	L-52
Coal Stokers.....	22,669	.....	.....	L-75
Boilers.....	10,500	37	.....	L-42-III
Baby carriages.....	5,200	.....	.....	L-152
Oil burners.....	4,958	.....	.....	L-42-V
Hairpins.....	3,143	.....	.....	L-104
Lighting fixtures.....	2,500	.....	.....	L-78
Looseleaf metal parts.....	2,237	.....	.....	L-188
Bed springs.....	1,000	.....	.....	L-49
Milk cans.....	700	.....	.....	M-200
Refrigeration Condensers.....	700	.....	.....	L-126-II
Water Heaters.....	625	879	.....	L-42-IX
Shovels, scoops, etc.....	583	.....	.....	L-157-I
Plumbing fixtures.....	462	.....	.....	L-42-V
Hand tools.....	400	.....	.....	L-157-IV
Axes, hammers, etc.....	250	.....	.....	L-157-II
Saws.....	157	.....	.....	L-157-III
Lamps.....	108	.....	.....	L-28-a
Vapor and Vacuum Specialties.....	54	322	.....	L-42-VIII
Radio Tubes.....	3	.....	.....	L-76
Pumps and Drainers.....	.....	53	.....	L-42-X
Refrigeration coils.....	.....	1,030	.....	L-126-III
Refrigeration water coolers.....	.....	156	.....	L-126-I
TOTAL.....	211,567	2,972	1,171	.....

product simplification changes, including extensive substitutions of less critical materials and industry also has made voluntary savings through the same methods.

FREQUENTLY, however, substitution has resulted in increased use of steel or secondary aluminum though primary aluminum or copper may be saved. Illustrative of this situation is a change made by

the Army in the manufacture of shell casings. This move in 1942 freed 22,240 tons of copper but steel supply was diminished by the same amount. A parallel case exists where steel bullet jackets conserved 16,260 tons of copper. It is interesting that the manufacture of steel shell cases has not progressed further this year in view of the great amount of publicity which has been given the substitution.

One of the largest substitutions of secondary aluminum where specification changes resulted in conserving 18,000 tons of copper has been in fuse parts. More than 15,000 tons of primary aluminum were saved by the Army in this manner. The Navy also has made good-sized savings by employing 20,000 tons of steel to take the place of 14,500 tons of primary aluminum in ship construction.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



THE following is a list of the more important items indicating savings and how they were made:

Cartridge cases, 10,000 tons of primary aluminum specification change; canteens and mess kits, 1375 tons of primary aluminum, supplanted by steel; truck cargo bodies, 450,000 tons of steel, wood used instead; legging buckles, 2000 tons of copper, steel made to stand in; sectional coolers and ice boxes, 20,000 tons of steel, wood substituted.

The accompanying table on the effect of "L" and "M" orders is merely to illustrate what has been done in this respect.

"PUT IT ON THE BLANCHARD"

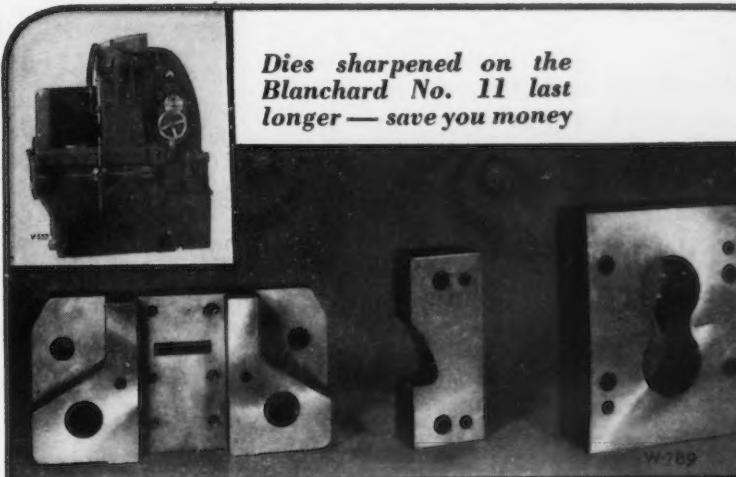
**CHECK THESE
ADVANTAGES
OF BLANCHARD
GRINDING**

- ★ **Production**
- ★ **Adaptability**
- Fixture Saving**
- Operation Saving**
- Material Saving**
- ★ **Fine Finish**
- ★ **Flatness**
- Close Limits**



*..... Especially
valuable on jobs like
the one illustrated.*

BLANCHARD



Tool makers - Die makers
**GRIND DIE JOBS LIKE THESE
ON THE BLANCHARD No. 11**

The cylinder wheel covers the entire surface at every revolution of the work. High work speed and ample supply of coolant eliminate any danger of heating the work. The Blanchard is a heavy and rigid machine, permitting the economical use of free, soft cutting wheels. "Excellent — Fast — Accurate" says this customer after more than a year of tool room use.

Savings in time and money, and opportunities to release men from grinding to other work, make it logical to install Blanchard Grinders in every tool and die shop.

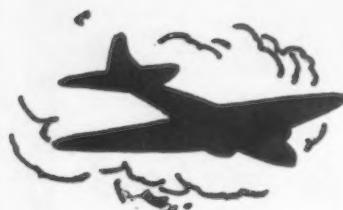
The **BLANCHARD**
MACHINE COMPANY
64 STATE STREET, CAMBRIDGE, MASS.

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.



WEST COAST . . .

• Consolidated Aircraft to open small parts plants in 12 communities in effort to solve labor supply problem . . . Scrap being sent to Chicago district mills from Far West.



LOS ANGELES—With beds on a 24-hour shift, and old maids not looking underneath because of the certainty that someone would be sleeping there regularly, San Diego's local Mahomet went to the mountains last week.

Consolidated Aircraft Corp., which moved to San Diego not so many years ago to find it a paradise of semi-and-totally unemployed sunbaskers and which a month ago began hiring the lame and partially paralyzed while dropping its 70-year-age limit, last week formally announced that it would open small parts plants in 12 California communities.

"Consolidated will lease available space in communities where labor, particularly women, is available," declaimed President Harry Woodhead. "Experienced production personnel will be sent to each plant to train new employees where production will be confined to small parts."

"Each plant probably will work at first on a one-shift basis. Parts to be made at the plants will be those requiring the minimum of tooling and will augment the production at San Diego of such parts as electrical wiring installations, bench assemblies, etc."

Consolidated pay checks, leagued with those of the Ryan and Solar aircraft plants and abetted by civilian payrolls of the Army and Navy, put the entire retired population of San Diego, from 12 years old to 60, on the payroll shortly

after war started. By 1940, the town's payrolls accounted for the support of 203,000 persons. Immigration to this plane building Mecca became considerably faster after the census taker left, but when the population indicator hit 340,000 this summer, it wavered and held steady. The influx of workers ceased, simply because there was no more available housing in the town or transportation from the environs. Then Consolidated began calling up the reserves, announced that it was hiring the physically handicapped, those of impaired vision, and septuagenarians. Apparently even this has not been sufficient to help the big factory fill its big orders for big airplanes (B-24 Liberator bombers, Catalina and Coronado flying boats). Like the Spanish explorers, whose maps charted California as a wealthy island ruled by women, Consolidated will go forth to find 12 cities populous with Amazons, the first prime contractor to set up its own feeder plants to speed aircraft production.

Douglas Aircraft at Santa Monica, which also caters heavily to the ladies, now reportedly has 35 per cent women workers on its payrolls, with the hiring ratio favoring the females three to one.

A WAR Manpower Commission program for stabilizing labor in the five states of California, Oregon, Washington, Arizona and Nevada, was described last week by William K. Hopkins, regional WMC director, as "setting up the framework for control" of labor. Paul V. McNutt, national WMC chief, was quick to say that the plan "will undoubtedly serve as a model for other regions and it is expected that similar plans will be developed throughout the nation." He called it "a great achievement."

To be extremely technical, as the Government itself has a way of being when talking to industry, the plan should have been described not as a "framework" nor as "a great achievement" but merely as a project sign proclaiming that construction would begin at an early date. Inasmuch as WMC failed to follow the usual custom in connection with construction projects involving the Government—

the posting of a good stiff performance bond—the project must perform, until actual results are apparent, be regarded as another one of the Manpower Commission's promotional schemes and subject to the usual McNutt discount.

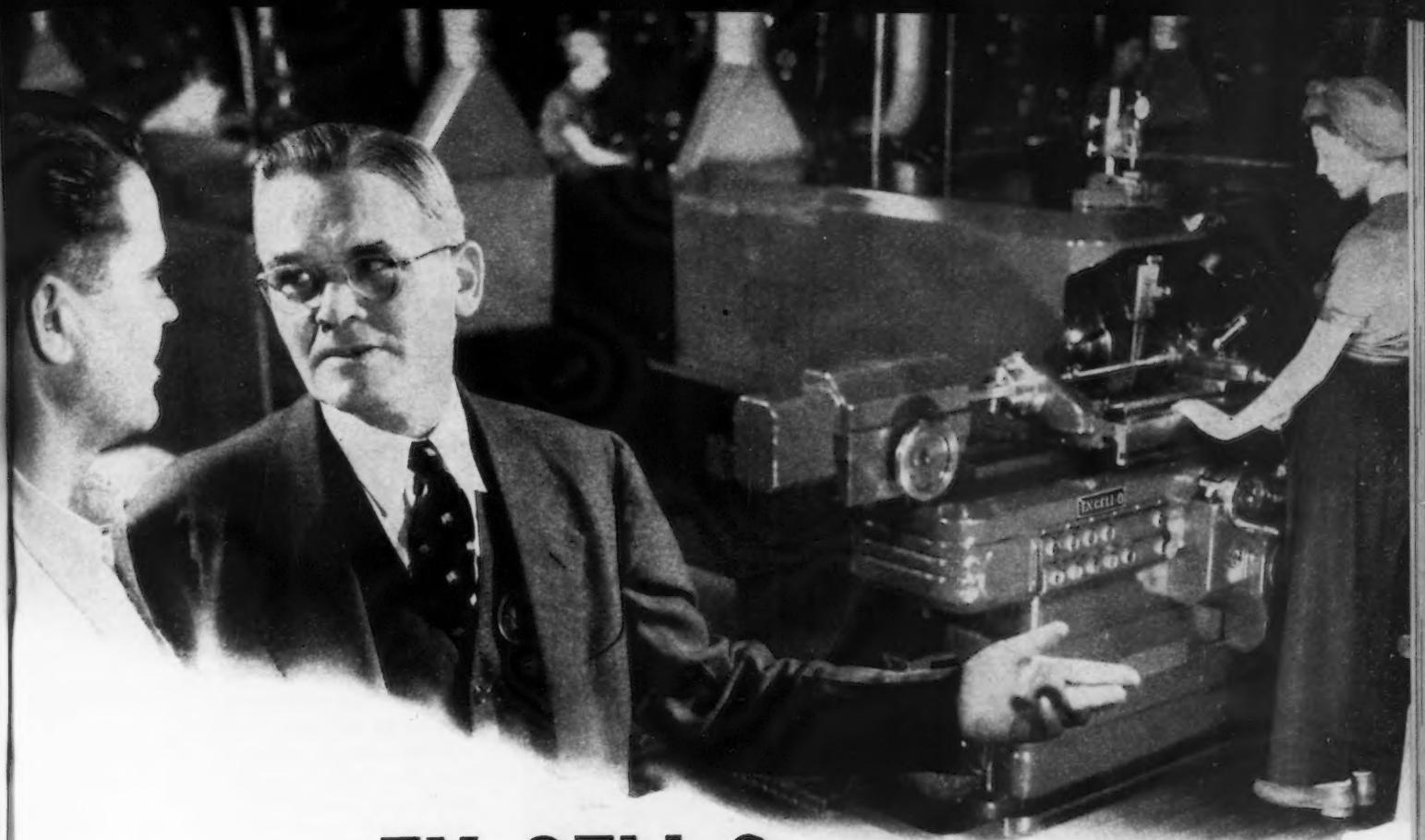
The brochure for this latest "pattern" states that the regional War Manpower office, with the co-operation of the various (sic) Government agencies, will set up lists in each area showing the relative importance of each industry to the war effort. The Department of Agriculture is called upon to provide information concerning relative importance of crops, acreage and locations in order that the WMC may anticipate labor requirements.

The plan provides, "contact shall be made with companies, unions and industries in the order of their importance to the war effort, commencing with critical war industries, for the purpose of having management and labor assume the responsibility of conducting a survey in each industry in the form approved by WMC."

WMC industrial area directors will initiate immediately joint discussions between employers and employee representatives to "work out particular problems with reference to the full and proper utilization of manpower to the end of controlling absenteeism, shifting of workers, discharges, quittings, and layoffs."

All such plans are subject to approval of the regional War Manpower Commission which "shall be responsible for coordinating and integrating the area labor stabilization plans to the end that a substantially uniform pattern of labor stabilization is achieved and made effective throughout the region."

When cooked well, these verbal vegetables will probably boil down to a simple hope on the part of WMC that organized labor will get together universally with the boys in the front office and agree upon a polite blacklisting scheme similar to the one voluntarily inaugurated two months ago in San Francisco Bay shipyards (see "West Coast," October 8, 1942). By such a scheme, a worker leaving a shipyard job can be employed by another shipyard only upon presentation of written clearance from his



They're EX-CELL-O Machines

. . . KEEP THEM GOING ALL THREE SHIFTS

Over each of the four plants of Ex-Cell-O in Detroit fly three flags . . . the Stars and Stripes, as always, the Army-Navy "E" pennant, and the first U. S. Treasury "Bull's-Eye" War Bond flag.



UNINTERRUPTED production is industry's most urgent job today—"round all the hours on the clock every machine that can "take it" must be kept going if the vast volume of work that war demands is to be produced without delay. . . . Wherever Ex-Cell-O precision machine tools are in use, there's no problem as to continuous service. They're designed and built to "take it", every hour of the day, every day of the week. The Ex-Cell-O name on a machine tool means not only a precision-built machine to do precision work, but a machine that gives the utmost in efficiency with a minimum in maintenance attention. . . . To get the best use out of any Ex-Cell-O equipment you have in your plant, you should have available the practical information in the Ex-Cell-O Instruction Book applying to the particular Ex-Cell-O machine you have. If you do not have one now, just write to Ex-Cell-O in Detroit, stating the type and the style of the Ex-Cell-O machine tool you're using, and a copy will be mailed immediately . . . without any cost to you, of course.

EX-CELL-O CORPORATION • DETROIT



Precision THREAD GRINDING, BORING AND LAPING MACHINES • TOOL GRINDERS • HYDRAULIC POWER UNITS • GRINDING SPINDLES • BROACHES • CONTINENTAL CUTTING TOOLS • DRILL JIG BUSHINGS • DIESEL FUEL INJECTION EQUIPMENT • R. R. PINS AND BUSHINGS • PRECISION PARTS

XLO

EX-CELL-O means PRECISION

NEWS OF THE WEST COAST

former employer. Such clearance is not granted unless the worker's labor and conduct record is good.

A plan of this type has odds in its favor, of course, in the shipyards which pay the highest wages of any of the war industries, and from which no worker wishes to escape any more than St. Peter from the pearly gates. In other industries, however, which are faced

cover they are eating their own seed grain, and when all other industry is frozen in like manner, stabilization will have been effected, but not until then. Drafting of labor may come first.

ARIVAL of considerable quantities of demolition scrap from war areas continues to bolster Pacific Coast stocks. Allocation of

SCRAP SQUEEZE: The newest and largest hydraulic baling press west of the Mississippi is squeezing scrap for the California Scrap Iron Corp., Oakland, Cal. Here an auto body is shown being tumbled into the pit which will compress it to an 18 in. bale. Shown watching the operations are (left to right) Don Nehar, regional director and William Breuer, district director of the WPB Conservation Div. and Henry and Marshal Shapiro, heads of the scrap concern.



with inter-industry as well as inter-company pirating, certain drawbacks are obvious. Unless the shipyards, for instance, are willing to unanimously demand written clearance of former workers in the aircraft industry, threat of withholding clearance is not likely to inspire awe. To expect an employer, whose emaciated labor force is severely hampering his production, to demand clearance of applicants for work is to expect a starving man to refuse bread. So-called labor freezing orders in the lumber and non-ferrous mining industries, patterned along similar lines, have shown that labor hunger is too great for functioning to be satisfactory. When the time comes that employers in these industries dis-

initial shipments of this material, arriving in lots from 1500 to 2500 tons each, all to Bethlehem's Pacific Coast plants, made impossible for a time acceptance of domestic material. Columbia Steel Co., U. S. Steel Pacific Coast operating subsidiary, is expected to draw the next batch, with the "no scrap wanted" sign transferred to its mills.

As well as providing a bounty for the steel industry, the war area metal considerably eases the non-ferrous scrap situation.

Concurrently, increasing quantities of Maritime Commission and Navy Yard scrap are being allocated to Chicago district mills, and the Coast's ultimate donation to the Mid-west blood bank will be

close to 100,000 tons. Moving on direct allocation, the material bound for the mid-west carries a freight bill of \$14 per ton, approximately \$10 of which is absorbed by War Materials, Inc. Compared to digging up street car rails, the recovery agencies consider it's a bargain.

This material is moving eastward not without tears from the Coast mills who see eastbound carloads of No. 1 scrap pass enroute westbound train loads of public scrap drive donations. The public drive proceeds, principally low grade material in need of extensive sorting, is being shipped to the Coast from as far as 200 miles from tidewater. During the past months, the Coast's scrap inventory is estimated to have gained 44,000 tons.

With construction on the home stretch, officials of the Kaiser steel works at Fontana, Cal., still insist that no purchased scrap will be required for the operation. While other Coast mills operate on close to 100 per cent scrap charge in their steel furnaces, plans for the Kaiser mill cling to the belief that pig iron from the single 1200 ton stack plus whatever mill scrap is available will solve the materials problem economically. This belief is being questioned by some members of the trade who doubt that pig iron can be produced on the Coast under present conditions at a price that can touch scrap price ceilings.

Fargo Foundry Suspended

Washington

• • • For 90 days the Fargo Foundry Co. of Fargo, N. D., will be denied all priority assistance and allocations of restricted materials. WPB issued Order S-155 on Friday, claiming that the company filled unrated orders for a substantial number of steel tanks of a capacity greater than 65 gal. for gasoline storage. Such sales are prohibited by Order M-68-c.

Materials Saved in Tanks

• • • Changed specifications for parts for the M-4 tank are expected to save, during 1943, more than 7,000,000 lb. of nickel, about 2,000,000 lb. of chromium and nearly 1,000,000 lb. of molybdenum. The changes, recently approved by the Army, were initiated by the War Engineering Board of the Automotive Council for War Production.

YOU'LL FIND IT WILL PAY TO **TRUSCONVEY**

YOUR PLANT MATERIALS

TRUSCONVEY means the quick, Johnny-on-the-spot movement and delivery of parts and materials—from neat, orderly, easy-to-get-at points throughout your plant—with the aid of strong, efficiently-designed Truscon Steel Boxes and Skid Platforms.

Now, to meet wartime needs, your plant must be geared up to production schedules never before required. That means *faster* action, *less* waste motion, *more efficient* work in each and every one of your manufacturing steps. • You can help meet these new requirements of your plant by permitting us to study your handling operations and requirements. We then can make well-planned recommendations exactly suited to your needs, embodying Truscon Steel Boxes and Steel Skids designed to fit your individual needs. • Throughout America, Truscon Materials Handling Equipment is simplifying operations and speeding production. Its ability to stand up year after year despite hard service and adverse conditions, has proved that in the long run it is the cheapest and most profitable equipment. • Learn to say **TRUSCONVEY**—learn the many benefits you will receive from Truscon Steel Boxes and Steel Skids—write us for illustrated literature today, and ask for a plant survey without obligation.



Investigate TRUSCON Foundry Flasks

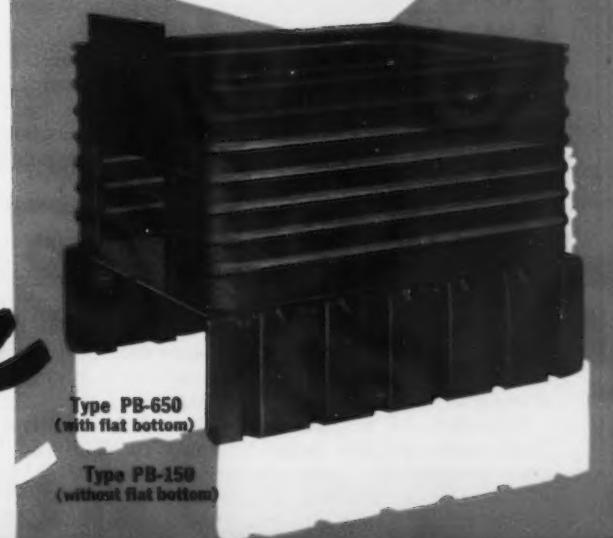
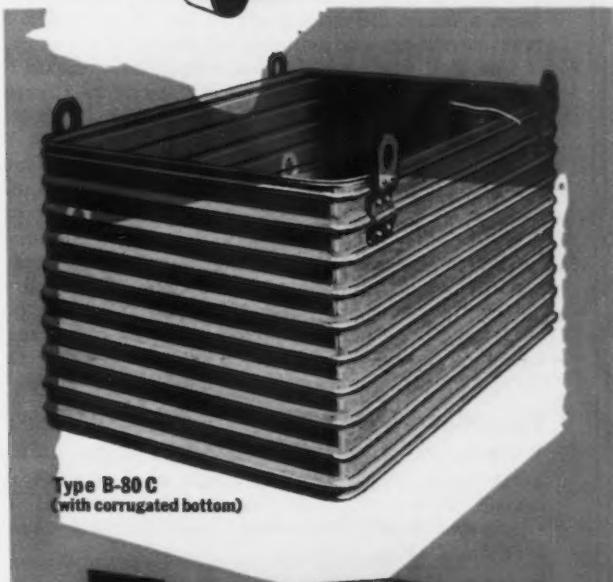
Light weight . . . durability . . . strength where strength is needed . . . easily rammed and shaken out . . . these are features of economy and production you get in TRUSCON foundry flasks. Write for descriptive literature on complete line.

Truscon

MATERIALS HANDLING EQUIPMENT

Truscon Steel Co., Pressed Steel Division, 6100 Truscon Avenue, Cleveland, Ohio. Subsidiary of Republic Steel Corporation.

YOU'LL FIND IT WILL PAY TO **TRUSCONVEY** YOUR PLANT MATERIALS



Fatigue Cracks

BY A. H. DIX

Specialists' Specialist

• • • A WPB man dropped into one of our branch offices the other day and asked for a copy of the priority guide. He passed the time o' day with our local manager, who asked, "And what is your particular work?"

"I," answered the WPB man, "am technical consultant to the technical consultants."

Friend to Man

• • • A man we admire is C. E. Ihrie, sales manager of the Aro Equipment Co., Bryan, O. He knows his name is susceptible to several pronunciations, so he removes doubt by having this explanation printed on his calling card:



should tell us how to pronounce the name, as we would like to ask for a tube sometime. We can think of at least a dozen different ways to say it, of which eleven must be wrong, and possibly all twelve are.

The Pall Mall people, too, ought to give us an official pronunciation. We always say it to rhyme with "Oh, What a Pal Was Mary." But understand that uptown they sound it like the third word of "A Pretty Gel is Like a Melody." Pell Mell sounds affected to our ears, but if the Pall Mall people will try to make it unanimous we will string along.

Afflicting a product with a hard-to-pronounce name has always seemed to us like entering a 100-yard dash, but dressed for the potato sack race. We read somewhere the other day that Djer-Kiss, the face powder that used to be heavily advertised, may soon greet you again in the public prints. That "j" is going to cost them a lot of money.

Two-Way Stretch

• • • On Nov. 12 we remarked brightly, "We have never seen (price) ceilings with such a high elastic limit." Frank O. (Sterling Grinding Wheel) Klapp cracks that now he knows where all the rubber has gone —to build those ceilings.

Solid Senders

• • • Your Southern California outpost writes that a Los Angeles electrical distributor is named Listen-walter & Gough. If Gough is pronounced "go," we classify the name 1-A, but our corporate cognominal favorite is still the big Kansas hardware wholesaler, Blish, Mize & Silliman.

Chaplain vs. Myth

• • • We will bet a Landon button against a Fisk "Time to Retire" placard that Captain Maguire loses his fight to divorce himself from the saying, "Praise the Lord and . . ." The public has pinned the phrase to him, and that's that. He might as well give in gracefully, for history shows that in cases of this kind myth always kayoes fact.

Sherman did not say "War is hell," nor Pershing, "Lafayette, we are here." "Trust in God and keep your powder dry" was thought up long after Cromwell's pancreas stopped pancreatic.

As military life gives language the gamey flavor a hung duck acquires along about the third week, our soldiers' and sailors' epigrams are oftentimes chlorinated from sheer necessity, to make them suitable for Junior's little ears. For example, the schoolbooks credit Ethan Allen with saying, as he took over Fort Ticonderoga, "In the name of the great Jehovah and

the Continental Congress." What he actually said could not be aired over the Blue Network. The noble expression credited to Count Cambronne at the Battle of Waterloo — "The Old Guard dies but never surrenders"—was a posthumous pinchhitter for a remark too scatological for this family journal to repeat.

But we are getting off our course. We just want to tell the chaplain that he might just as well try to head off a Kansas twister as to stop a myth, once it gets under way. Let him neither affirm nor deny, just smile; and in twenty-five years public opinion will have convinced him that he did say it.

Old Man

The Stearns Magnetic Mfg. Co. adv. on page 100 of the Nov. 12 issue refers to a magnet that "fits any standard old man stand." My conception of an "old man" is hazy. Just what is it?

—Deac

None of our glossaries includes it, but Frank Joseph Oliver, your favorite family journal's technical editor comes through with this definition:

An "old man" is a device that acts as the fulcrum for a simple lever used to apply end pressure on a drill.

Frank does not know how the term originated, but if you do, will you enlighten us?

Mystery Plant

• • • The censors frown on the publication of names and addresses of defense plants. It is all right to say that the Bethlehem Steel Co. is located in Bethlehem, Pa., but our knuckles would be rapped if we mentioned that the L'Amour Lipstick Co., of Prettypuss, Pa., is now making fuse parts.

Secrecy is the rule—within reason, of course. But reason was passed the other day when we received a letter from a western New York State ordnance plant, ordering a copy of the Tool Steel Directory. No address appeared on the printed letterhead. The address was not typed in, nor was it given in the body of the letter. If it had not been for the brains department, which knows everything, we would have had to let the request go into our "The h . l-with-it" folder.

Film-Flammer

• • • Don MacDonald of the brains department tells us that a New Jersey manufacturer asked us over the telephone the other day, "A man called this morning, saying he was from Wide-World Photos. He says you sent him and that you want my picture."

Wide-World Photos, a highly reputable concern, had never heard of him. Nor had we, and we so informed the manufacturer, who said he would have a policeman on hand to look at the birdie with him when the photographer called to take the pictures.

Your favorite family journal has no official photographer, but we think it is an excellent idea for you to have your picture taken every so often, as you never can tell when something will happen to warrant a hurry call from us for your latest likeness.

Puzzles

Captain F. L. Oliver, of the Office of Inspector of Naval Material, Pittsburgh, squawks thus concerning the Nov. 12 spilled potato problem:

I descry youth behind gray whiskers! Last time these potatoes were jellybeans. Another time they were marbles. Again they were apples. And so it goes.

Puzzles, like jokes, are eternal. They are reborn every decade, slightly refurbished. Next time it will be cumquats.

The reward for filling in the blanks in the following is nothing but glory. But if you would rather spend your time winning a War Bond, turn to page 183:

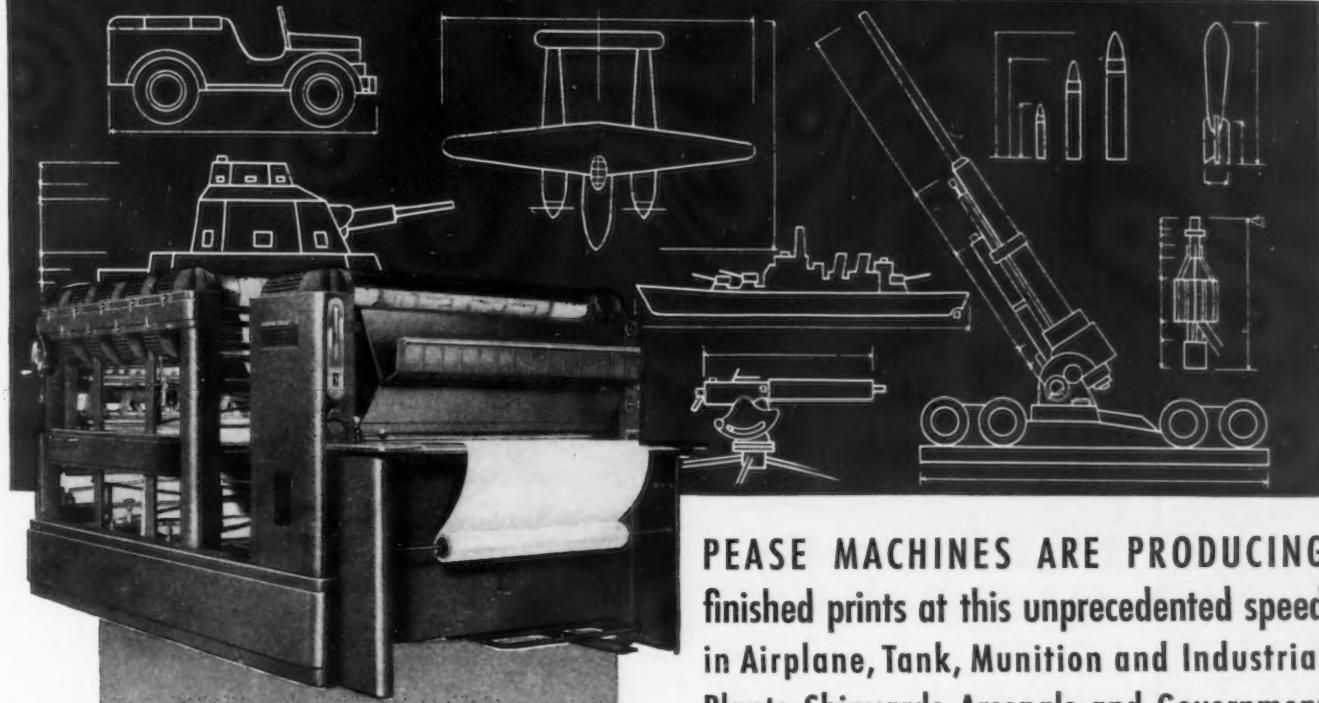
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.50.

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BLUEPRINTS

AT 30 FEET PER MINUTE ARE
HELPING TO BEAT THE AXIS



PEASE MODEL "22" FEATURES Speed Blueprint Production

- ★ Sliding "Vacuum-Like" Contact smooths out wrinkles, prevents errors.
- ★ Three Speed Lamp Control provides operation at 10, 15 or 20 amperes, does away with running speed and dryer heat changes.
- ★ Actinic "No-break" Arc Lamps burn for 45 minutes without breaking arc, resume instantaneously.
- ★ Horizontal Water Wash Rolls prints free from tension and prevents wrinkles, stains, bleeding.
- ★ Chemical Applicator System very economically allows change from Blueprints to Negatives in 30 seconds.
- ★ Rapid Drying Drums, heated either by gas or electricity, are thermostatically controlled.

PEASE MACHINES ARE PRODUCING finished prints at this unprecedented speed in Airplane, Tank, Munition and Industrial Plants, Shipyards, Arsenals and Government Departments throughout the Nation

The number of Blueprints needed to beat the Axis simply staggers the imagination, for industrial plants and government departments need hundreds upon hundreds for shells, bombs, machine guns and anti-aircraft guns . . . thousands upon thousands for planes, tanks and jeeps . . . tons upon tons for battleships, carriers, transports and cruisers . . . for example, a recent tank improvement required almost 1000 pounds of Blueprints.

Blueprints have the all-important job of speeding the engineers' plans, details and specifications to the production lines, and Pease Model "22" Continuous Blueprinting Machines, with a practical production speed of 30 feet per minute, are helping America exceed its stepped up production program. They operate faster, more economically and require less attention, making sharper, clearer, more contrasty prints from pencil or ink tracings.

Write for complete information.

THE C. F. PEASE COMPANY

2695 WEST IRVING PARK ROAD • CHICAGO

Pease Blueprinting Machines

A TYPE AND SIZE FOR EVERY REQUIREMENT INCLUDING DIRECT PROCESS PRINTING

Dear Editor:

MYSTERY VISITOR

Sir:

Your subscription representative called on us the other day and suggested that we renew our subscription to THE IRON AGE, which he explained had recently expired.

During the course of our interview he suggested a three-year renewal subscription, to cost \$20. . . .

PAUL H. SPITTLE,
Advertising Manager
*Lipe-Rollway Corp.,
Syracuse, N. Y.*

• Our New York State circulation representative has not been in Syracuse recently, and we have no reduced rate of three years for \$20, two facts that lead us to question the authenticity of Mr. Spittle's visitor. Mr. Spittle provides us with this description: "Age, 50-55; height, about 5 ft. 10 in.; weight, 150-160; hair, slightly gray; face, clean shaven; wore glasses; had a fairly prominent nose; well dressed; apparently well educated; and possessed a pleasant personality." This may be "A. Moore" who victimized several manufacturers in northern Ohio. "Mr. Moore" issues a receipt bearing the name of a non-existent organization, "Publishers Service Bureau." If this gentleman should call on you, will you send a wire collect to THE IRON AGE, Reader Service Dept., 100 E. 42nd St., New York City.—Ed.

HARDNESS TESTING FILES

Sir:

The article in your Sept. 24 issue, "File Hardness Testing" by John H. Hruska, mentions a set of hardness testing files. I should like to know if such a set can be purchased and from whom.

BEN HOOVER
*Ohio Steel Foundry Co.,
Lima, Ohio*

• As far as we can find out, no file company, nor anyone else, sells prepared sets of hardness testing files. Apparently every user assembles his own.—Ed.

RESEARCH GUIDE

Sir:

Can you help me locate some sources for information and reports which may be coming out on research and development work from time to time?

J. P. DODS,
Director of Research
*Summerill Tubing Co.,
Bridgeport, Pa.*

• The best bets are: Engineering Index, issued by the Engineering Societies, 29 West 39th St., New York; and the Industrial Arts Service, published by H. W. Wilson & Co., 960 University Ave., New York.—Ed.

FORWARD LOOK

Sir:

Will you kindly send us a copy of the article, "What's Ahead In Industry," by John H. Van Deventer.

E. P. HUBSCHMITT,
Engineer of Tests
*Devoe & Raynolds Co., Inc.,
Louisville, Ky.*

• This is the title of an address delivered by John H. Van Deventer, president and editor of THE IRON AGE, on Sept. 22 before the New York Sales Executives Club. It was not published in THE IRON AGE. Copies are available, and one has been sent to you.—Ed.

GAGES

Sir:

In the Sept. 3 article, "Foolproof Gaging Systems," a mention is made of a multiple purpose electric contact gage and also a pneumatic gage. Who makes them?

OLIVE MAYER,
Standards Engineer
*Western Gear Works,
Seattle, Wash.*

• **Sheffield Corp., Dayton, Ohio.** Pratt & Whitney, West Hartford, makes similar types.—Ed.

ORDNANCE BOOK

Sir:

Please send me two copies of "Munitions and Ordnance Manufacture" booklet, mentioned in a recent issue. Enclosed is a check for \$2.

R. S. LITTLE
*Universal-Cyclops Steel Corp.,
Detroit*

• The demand exhausted our supply. However, a new and larger edition is now being printed under the title, "How To Make Munitions and Ordnance." This new edition has 154 pages. The price remains at \$1 a copy.—Ed.

TOOL STEEL DIRECTORY

Sir:

I met up with a very compact little booklet covering the analysis of all of the country's tool and die steels and want one.

I have charge of steels of all kinds at the Ordnance Plant here and will appreciate such a compact book. I am enclosing 25c in stamps.

A. M. FORD
Des Moines, Iowa

STEEL TABLES

Sir:

I would appreciate your sending me four copies of "Significant Steels

Commonly Used for Specific Articles," published in the Nov. 19 issue.

F. W. SHICK,
Lieut. (jg), USNR
*Navy Department,
Washington, D. C.*

NEW GEAR STEELS

Sir:

I believe there was an article in a July or August issue, by Mr. Davis of Warner Gear Co., dealing with heat treatment of gears. Please send me clippings.

HARRY A. JOHNSON

Syracuse, N. Y.

• "National Emergency Gear Steels" by E. F. Davis, appeared in the Aug. 6 and 13 issues. Clippings are being mailed.—Ed.

SPONGE IRON

Sir:

Could you give us any information on the Sponge Iron process of making steel?

O. HALVARSEN
*Arthur C. Harvey Co.,
Boston, Mass.*

• See page 81 of the July 23, 1942, issue.—Ed.

CUTTING TOOL GUIDE

Sir:

Representatives of this District have read with interest your Oct. 1 issue, and have been especially attracted by L. J. St. Clair's article on "How To Select Efficient Cutting Tools." The guide for the proper choice of cutting tools included in his article, contains a wealth of information which can be used to good advantage.

Are reprints available, and what is the cost of six?

H. L. BRENNER,
1st Lt., Ord. Dept. Asst.
*War Department,
St. Louis, Mo.*

• Six copies are being mailed to you. No charge.—Ed.

STEEL FOUNDRY

Sir:

Some time back you published an article on making steel castings in a converter furnace, without the use of electricity. Would you please give us some information on the building of a converter of this type?

A. DEBOGORY,
*U. S. Foundry & Mfg. Corp.,
Miami, Fla.*

• See p. 88, July 23 issue, and p. 101, Oct. 1 issue.—Ed.

UNINVITED "S"

Sir:

I was very much interested in your article on steels commonly used for specific articles (page 51, Nov. 19 issue), but I notice under "Automatic Screw Machine Parts" you list a BS-1112, and I fail to find in the article anything to describe the "S." Will you please enlighten me?

R. H. BLISS,
President
*Bliss Steel Products Corp.,
East Syracuse, N. Y.*

• The "S" was an error. The steel should have been referred to as B-1112.

WHEELABRATOR

Peacetime Engineering Paves Way For Wartime Speed-Cleaning Records

WHEN the drums of war began to roll American was ready with the engineering experience and plant facilities to meet the urgent need for new types of speed-cleaning equipment.

Special high-production machines for cleaning guns, shells, bombs, armor plate, aircraft engines, tank parts, etc., had to be designed quickly. Our engineers handled the job in record time because they were able to draw upon a wealth of experience in designing equipment for hundreds of complex cleaning jobs.

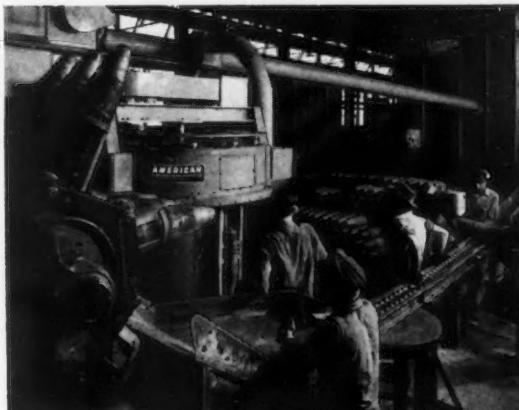
Fortunately, too, the healthy peacetime demand for WHEELABRATOR was such that our plant and manufacturing facilities had been greatly expanded. Again we were ready for the call to arms and the ever increasing demand for WHEELABRATORS—the equipment that is making speed-cleaning records in war plants throughout the nation.



AMERICAN'S March of Progress

Leadership in Research and Engineering Design has enabled American to originate these outstanding metal cleaning developments:

- Airless Abrasive Blasting. (the Wheelablator)
- Tumblasts — with the exclusive apron conveyor for tumbling.
- Tablasts—plain and multi-rotary table types.
- Special Cabinets for automatic and continuous cleaning.
- The Wheelablator Room with mobile blast unit.
- "Humane" blast cabinets and rooms.



Do you know that:

11,172,271 pounds of gray iron castings have been cleaned by Stedman's Foundry & Machine Works, Aurora, Ind., since April 1940 with a 36" x 42" WHEELABRATOR Tumblast. Average cleaning time is only two minutes for thousand pound loads.

A prominent aircraft engine manufacturing plant is using Wheelablator Tablast with four 48" dia. tables to clean aluminum engine heads which are made of pure virgin aluminum ingot cast in baked

sand molds. Nine heads are placed on each table and in three passes under the WHEELABRATOR blast all surfaces, including the deep fins, are thoroughly cleaned.

The 36" x 42" WHEELABRATOR Tumblast at the Bierman-Everett Foundry, Irvington, N. J., cleans loads of brass castings in 4 min. and gray iron castings in 6 min. Cleaning time is only 1/3 of that required with their former tumbling barrel and air blast barrel.



AMERICAN FOUNDRY EQUIPMENT CO.

Blast Cleaning and Dust Control Engineers

510 SOUTH BYRKIT STREET • MISHAWAKA, INDIANA

This Industrial Week . . .

- **War Strategy Change Confuses Many**
- **Subcontractors' Cancellations Reported**
- **New Restrictions Seen on Alloy Steel**
- **Ingot Production Unchanged at 99.5 Per Cent**
- **Wolcott, Barringer Differ on Scrap**
- **Gas Rationing May Hamper War Output**

SUCCESSES in preliminary rounds of the United Nations' drive to deliver a knockout blow to the Axis nations next year are reverberating throughout the American metalworking industry. All sections of industry in the U. S. are now throwing their full power behind the production of offensive weapons, such as heavy bombers and ships.

This new phase of the war, supported by six or seven weeks of almost uninterrupted victories on land, sea and air and stimulated by talk of peace (by Churchill, Lyttelton and others) sets up new problems.

Readjustment of war contracts is confusing many companies. While they know the war is far from being won, they are receiving stop orders on war material items of which it once seemed the nation could never get enough.

An example—the machine tool industry reports an increase in cancellations which are partly due to the switch in emphasis to fighting planes and ships. Structural and reinforcing fabricators report many cancellations—a result of the WPB decision to curtail construction programs drastically in order to make materials available for direct military use.

Already slashes in tank production schedules have been reflected in lessening pressure on some mills which have been rolling tank plates.

By midweek the growing talk of "peace within a year" and the uncertainty created by closer gearing of war production to military strategy were vexing scores of companies holding subcontracts. Appeals were being made to prime contractors not to cancel subcontracts during the present readjustment period.

ONE such appeal came from Brig. Gen. T. S. Hammond, chief of the Chicago Ordnance District. War industry has passed the preparatory stage in war production, a period of location and conversion of facilities, he said. "It is now entering the second stage when it is necessary to synchronize war production with combat strategy. Because of limited transportation and raw materials, industry must expect periodic changes in production schedules and in the emphasis placed on various war production programs.

"As these production cuts come," Brig. Gen. Hammond warned, "it is my urgent plea that you think twice before doing the natural thing of canceling satisfactory subcontracts in order to bring the war orders into your own plants. The preservation of these plants is in your hands. If you leave them a share of ordnance's current production they will survive. If you

take too much away from them, they will not be here to contribute to our welfare either in this war or in the peace to follow."

Brig. Gen. Hammond thus presented one of the first official comments on the significant changes now under way in war plant production schedules.

Of all segments of industry studying this war contract readjustment period, none watched more attentively than the thousands of "strictly civilian product" companies shut off from supplies of steel and other metals because their plants have no place in a war industry machine.

OFFICIAL and unofficial statements on the steel supply situation—some of which seem to be in conflict—have brought perplexity to both producers and consumers. As reported in THE IRON AGE two weeks ago, the WPB will not permit any piling of ingots but will see that any steel production in excess of that required for direct war requirements will find its way into essential civilian needs.

The phrase "piling of ingots" is misleading since it would seem to indicate a stock of ingots for which no general use in the war effort is available.

As to the extent of raw steel stocks in various steel plants, THE IRON AGE has learned that at some plants in the Chicago, Pittsburgh and Eastern districts, the inventory of ingots is slightly higher than it had been before Lend-Lease requirements. (The U. S. and Britain are understood to have made an agreement on the 1943 volume of Lend-Lease steel shipments.) The condition at these mills by no means indicates a "piling of ingots."

At one of these plants in the East the situation was in a class by itself since almost the entire output of steel ingots has been allocated for Lend-Lease requirements. As this plant has no finishing facilities, these ingots must be shipped elsewhere.

In another case, a company which had built up a slightly heavier ingot inventory, did so because of a breakdown in blooming mill equipment. The inventory will be dissipated rapidly now that repairs have been made. In the other cases investigated, WPB revisions in the December steel quota will correct this temporary situation.

MOST of the current reports of ingot stocking refer to carbon steels. The situation in alloy steel production is not only tight but seems to be nearing some sort of climax. Last week the WPB put pressure on various steel companies which are not now making

alloy steel in their open hearths, (or are making small amounts), to explore the possibility of stepping up alloy steel production.

Further restrictions on essential civilian uses of alloy steel to assure maximum alloy steel output for direct military use are considered possible.

The alloy situation is complicated by the bottleneck in facilities such as needed trackage, stripping equipment, additional soaking pit capacity, hot top facilities, and the necessary slowdown in blooming mill practice in handling alloy steel.

In short—the present somewhat easier steel situation has been caused by (1) WPB reduction of 20 to 30 per cent in PRP requirements, (2) increase in WPB Limitation Orders and (3) the change in Lend-Lease distribution.

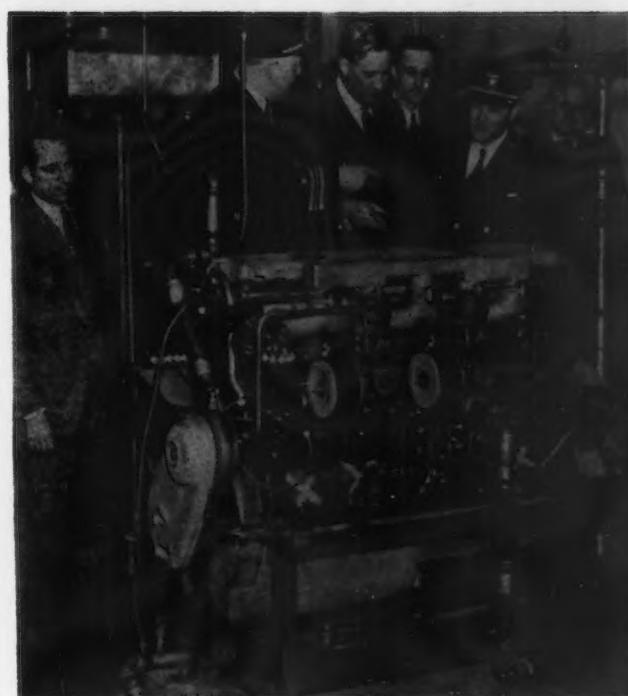
The WPB now seems to be in a position to review, where necessary, the restrictions on such essential civilian needs as transportation, food processing and others.

STEEL ingot production this week was unchanged at 99.5 per cent with the only alteration being Detroit's one-point drop to 104.5 per cent and the Eastern District's 9-point decline to 106 per cent. Other areas were unchanged from last week's schedules which showed 100.5 for Pittsburgh, Chicago and Youngstown; 93.5 per cent, Philadelphia; 97 per cent, Cleveland; 104.5 per cent, Buffalo; 89 per cent, Wheeling; 98 per cent, Southern; 105 per cent, Southern Ohio River; 102 per cent, Western; and 107.5 per cent, St. Louis.

This week scrap dealers and steel manufacturers were airing some of their views as to how effectively metal gathered in the recent nationwide household scrap collection is being utilized by the mills.

STEEL mills which a few weeks ago were urging the public to donate scrap to the various salvage drives are now, in many instances, so comfortable in regard to supplies that they have become "extremely choosy" with the result that scrap dealers may be left holding the bag. E. C. Barringer, executive secretary of the Institute of Scrap Iron and Steel, declared.

But R. W. Wolcott, chairman of the American Industries Salvage Committee, answered that the "heterogeneous" household scrap, which cannot be used to make steel for ordnance, armor plate, or other steels



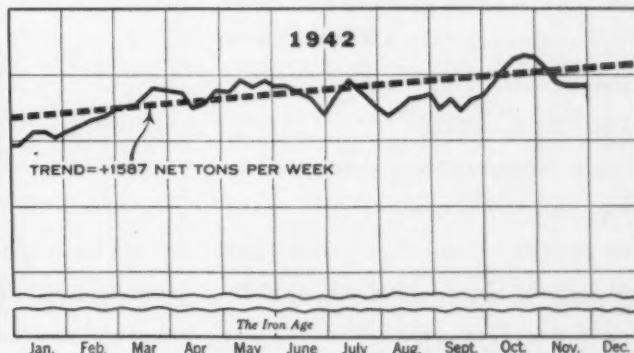
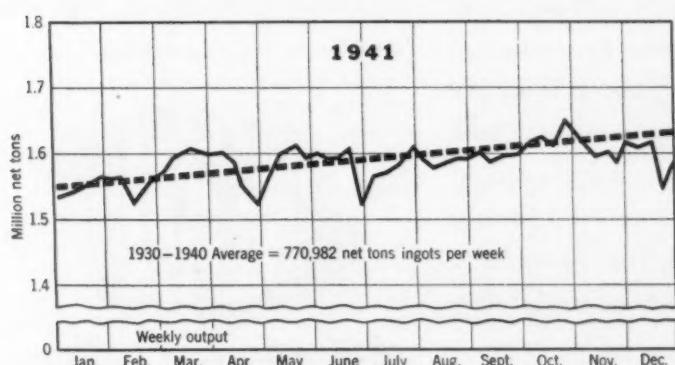
HUDSON INVADER: U. S. Navy and Hudson Motor Car Co. officials are shown inspecting the first "Hudson Invader" engine as it performed on the test block. This is a high powered, heavy-duty marine engine which is designed to power auxiliary boats.

which must be made to exacting specifications, is being used by the mills as rapidly as possible. Mr. Wolcott said the steel companies might investigate the possibility of "equipping themselves for sorting, cutting,

For the full text of statements by Messrs. Wolcott and Barringer, turn to page 154.

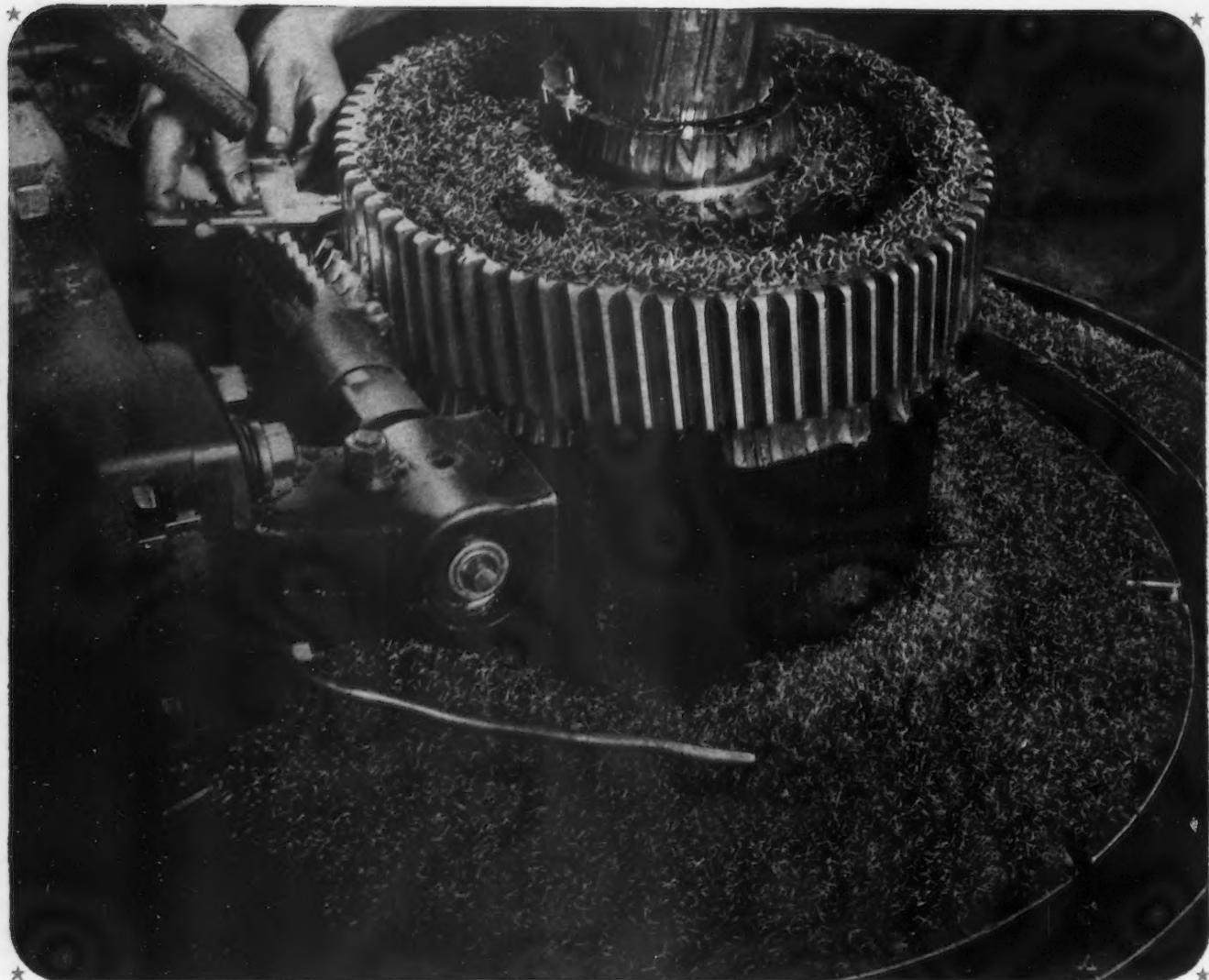
up and grading scrap to help relieve what seems to be a bottleneck."

Industry in some areas this week had its fingers crossed over the probable effects of gas rationing on war goods production. In the Pittsburgh area, where 25 per cent of the war workers use automobiles to get to work, many workers lack the necessary rationing cards.



Steel Ingot Production by Districts Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	S. Ohio River	West	St. Louis	East	Aggregate
November 26...	100.5	100.5	100.5	93.5	97.0	104.5	89.0	98.0	105.5	105.0	102.0	107.5	115.0	99.5
December 3....	100.5	100.5	100.5	93.5	97.0	104.5	89.0	98.0	104.5	105.0	102.0	107.5	106.0	99.5



KEEP 'EM CUTTING . . AND SAVE THE PIECES

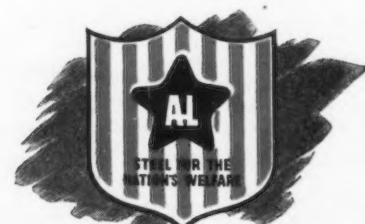
IN this war, machine tools on the average are cutting away steel at a rate more than 12 times faster than in 1918. That's production—keep them cutting!

Keep them cutting *faster* by selecting tool steels more closely suited to the job. Case after case in our files show increases in feeds, speeds, or pieces per grind—increases, often, of 50% and more—when the *right* tool steel went to work.

Keep them cutting *constantly* by knowing the best alternate tool steel for each job. Know it, and know its performance, as insurance against a time when your first-choice steel may be short in supply.

And save the pieces! Every particle of steel, especially High Speed Steel, is important, and much critical alloy material can be saved for re-use if proper methods of reclamation and classification are employed. Let

our Service Staff help with your problems of tool steel selection, treatment, use and salvage.



**Allegheny Ludlum
STEEL CORPORATION**
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

News of Industry

79% of Workers Favor 48-Hr. Week

• • • President Roosevelt's \$25,000 wage ceiling may soon face the test of standing or falling before legislation, according to Senator George, chairman of the Senate Finance Committee. Stating that he did not believe the ruling had a legal leg to stand upon, the Senator said that the salary order was certain to be challenged when Congress considered a new tax bill designed to increase revenue through compulsory savings or direct taxes.

The impending fall of Frances Perkins as Secretary of Labor is in the headlines this week with a report that the President is considering changes in his cabinet which would form the labor portion of it along parallel lines with that of the British Ministry of Labor.

Reported change is the exodus of Miss Perkins to a job in the Federal Security Administration and the appointment of Harold L. Ickes, now Secretary of the Interior and Solid Fuels Coordinator, to the post of Secretary of Labor. This would portend a complete rehabilitation of the Department of Labor, presumably switching the duties of the War Manpower Commission, the United States Employment Service and other sections of WMC to the Labor Department.

Also rumored is that Paul V. McNutt, erstwhile head of the WMC, will be given Ickes' present post of Secretary of the Interior. (This change in the manpower control setup of the U. S. plus the questioning of the President's arbitrary \$25,000 salary ceiling seems to foretell a lessening of the number of government bureaus and agencies and a less bureaucratic form of government in the future.)

The Gallup polls this week show that 79 per cent of war workers and 74 per cent of non-war workers favor a work week of at least 48 hr. Fifty-three per cent of war

workers stated that overtime pay should not begin until a 40 hr. week had been worked, although another 33 per cent voted for a 49-59 hr. week without overtime. Time and one-half seemed to be the agreed rate for overtime. The public indicated that overtime pay should not begin until a 48 hr. week had been worked. Increase from 40 to 48 hr. per week is estimated to be the equivalent of adding 3,500,000 workers.

The government moved this week to stop enlistments of essential aircraft and shipbuilding workers and expanded the list of necessary jobs to one out of every nine types in industry and agriculture. Maj. Gen. Lewis B. Hershey, Selective Service director, announced that the Army and Navy would refuse to enlist volunteers holding essential jobs in these classifications as well as men who had resigned from such jobs within 60 days before applying for enlistment.

NLRB members stood pat this week on their decision to have a hearing of the CIO grievance against the AFL on charges of having had help from Kaiser in organizing three of his West Coast shipyards and of holding an illegal closed shop contract. The hearing is scheduled for Dec. 14 in Portland.

Gist of the complaint by CIO was that the AFL had obtained a closed shop contract in three of Kaiser's yards (two in Portland and one in Vancouver) at a time when one yard had no employees and the others had less than one per cent of the anticipated number of employees. It was charged that by this method Kaiser actually helped the AFL to recruit members by accepting a closed shop which caused all new employees to automatically join the AFL. The Wagner Act requires that closed shop contracts may only be granted to a union after a majority of workers have approved that union. As this phase of the law apparently was overlooked in the granting of an exclusive AFL contract in these yards, it is expected that the NLRB will call for an election which will settle the controversy finally.

Strikes have dropped in number and lost man-days decreased during October, according to WLB statistics, while man-days worked

Factory Wages Show Increase for September

• • • Average wages in all industries during September were 88.5c. an hour—a gain of 2.4 per cent over August and 16.9 per cent over September a year ago, according to the Department of Labor.

In the durable goods industries (mostly war industries) the average wage was 99.4c. an hour—a gain of 2.9 per cent for the month and up 18.2 per cent over September of last year.

Average weekly earnings in all industries reached \$37.88, a 1.3 per cent rise for the month and up 25 per cent over the same period in 1941. Durable goods weekly wages averaged \$44.47, up 1.4 per cent for the month and 27.9 per cent over September 1941.

Average hours worked were 42.4 a week in all manufacturing industries, a decrease of 1.1 per cent from August but 3.9 per cent above September 1941.

have increased perceptibly. Strikes for the month dropped from 187 to 115 while man-day losses were reduced from 318,892 to 167,865 compared with September. Man-days lost by strikes compared with man-days worked represented 1/20 of one per cent during October, a new low since January.

WLB to Decentralize in Handling of Pay Disputes Cleveland

• • • A decentralization of the operations of the War Labor Board in handling disputes and wage stabilization matters can be expected, according to Lewis M. Gill, acting WLB regional director, addressing the first meeting of the WLB's 12-man labor-industry-public advisory committee.

The appointment of local panels whose decisions on voluntary and controversial pay questions would relieve pressure on the board at Washington and speed up the handling of pending and future cases might be expected shortly, he said. He told members at the conference that a recent ruling had empowered the regional branch to make final rulings on voluntary wage or salary applications to groups which had not received the 15 per cent cost-of-living increase allowed by the

NEWS OF INDUSTRY

"Little Steel" formula and in cases where manifest inequalities existed in wage structures.

Adjustments by this formula apply only to groups and not individuals who were employed in about 30 designated war industries. All pleas for adjustments over 15 per cent or in industries other than those listed by the WLB as "essential" must be decided by WLB in Washington. Requests for individual adjustments can be decided often without WLB approval.

Where a wage increase would lead the employer to seek price ceiling relief from OPA, adjustments are not allowed to be made by regional boards. Limitations on the approval of increases by the regional WLB director or regional panels prohibit final local rulings also where the number of workers affected, including employees granted raises since Oct. 3 exceeds 5 per cent of the plant force. In the case of the 5 per cent limitations, such adjustments may be allowed only once by regional approval. If additional workers in the same shop apply for adjustments, the Washington board must make the ruling.

In any case, Mr. Gill said, regional boards and panels cannot grant an increase exceeding 5c. an hour.

Pirating Fear Stops Pay Increase Plea

Franklin, Pa.

• • • Fear of labor pirating caused the unanimous rejection by the WLB of a 9c. general wage increase to employees of the Joy Manufacturing Co. here. The board, however, approved a 4½c an hour increase on the "little steel" basis and ordered an investigation to reveal gross inequalities if any.

The increase application was successfully negotiated between the company and the International Association of Machinists (AFL) at an agreed 9c. rate with the stipulation that an additional 6c. increase in ceiling rates of each classification be permitted when necessary.

The panel, considering the petition, based their unanimous rejection of the 9c. increase on the fact that the higher wages were being sought to enable the company to hire badly needed help to complete an important Navy contract. Believing that solidarity in the wage situation, without menace of labor pirating in this company's hiring, was more desirable than speedy hiring to expedite the Navy contract, the board voted a complete rejection.

14,000 Idle in 3 Plant Ford Canadian Strike

Windsor, Ont.

• • • Three plants of the Ford Motor Co. of Canada were closed Nov. 24 when approximately 14,000 UAW-CIO men struck as a result of a controversy concerning the wages being paid to newly hired women. The strike was called a wildcat by George Burt, regional director of the union, who also said that the strike would be taken over by the union in an effort to bring it to a quick conclusion.

Substance of the grievance was the fact that women were being hired at about half the pay men drew for equivalent work. Most of the 39 women recently hired were being paid about \$70 a month to start while men doing the same work earned about 75c an hour or approximately \$140 a month.

Mr. Burt said that the problem of equal pay for women had been discussed at a hearing before the Canadian War Labor Board in Toronto and that all companies in the Windsor area had agreed to equalize the pay between men and women.

A suggestion made the first night of the strike by chief conciliation officer of the Dominion Department of Labor to the effect that the men should return to work while the women were to be laid off temporarily, was flatly rejected by the union.

WPB Appoints Two Union Men to Posts

Washington

• • • Two union leaders were appointed to important positions in WPB this week it was announced by WPB chief, Donald M. Nelson.

Harold J. Ruttenberg, research director of the United Steel Workers (CIO) was named special assistant to H. G. Batcheller, director of the Iron and Steel Division, WPB. Matthew J. Burns, former president of the International Union of Paper Makers (AFL) was made special assistant to A. G. Wakeman, director of the Pulp and Paper Division.

Ruttenberg will also serve as a member of the Steel Division's Program Directive Committee. Mr. Burns has been on the staff of the WPB Labor Production Committee and former OPM Labor Division.

HURRIED LEAVE: When the Nazi Afrika Korps pulled out of Daba to save their necks from the oncoming British Eighth Army, wrecked planes and whole replacement fuselages were left in almost neat rows for the conquerors. These and many more like them will never again fly for the Nazis.

Press Assoc. Inc. Photo





A KILLER IN EACH Behind the Headlines

PORTER Quality Production Helps win the war



100 TON GOAL
AIMS SEEN MET

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Be Reach
Launchina

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HEADLINES won't win the war. Only rugged fighting, clever strategy, long-time planning and a constant production line will triumph. PORTER uses all these "Victory techniques" in building its Diesel Electric Locomotives. PORTER Diesels are ruggedly built, cleverly designed and

planned for future as well as immediate hauling needs. PORTER still produces greater power and speed at less cost per ton moved. Above, a 65 ton double power plant unit, one of the many locomotives supplied by PORTER to the U. S. Army, Navy, and industrial plants.

War News Summarized

Only PORTER Builds a Complete Line of Locomotives For Industry

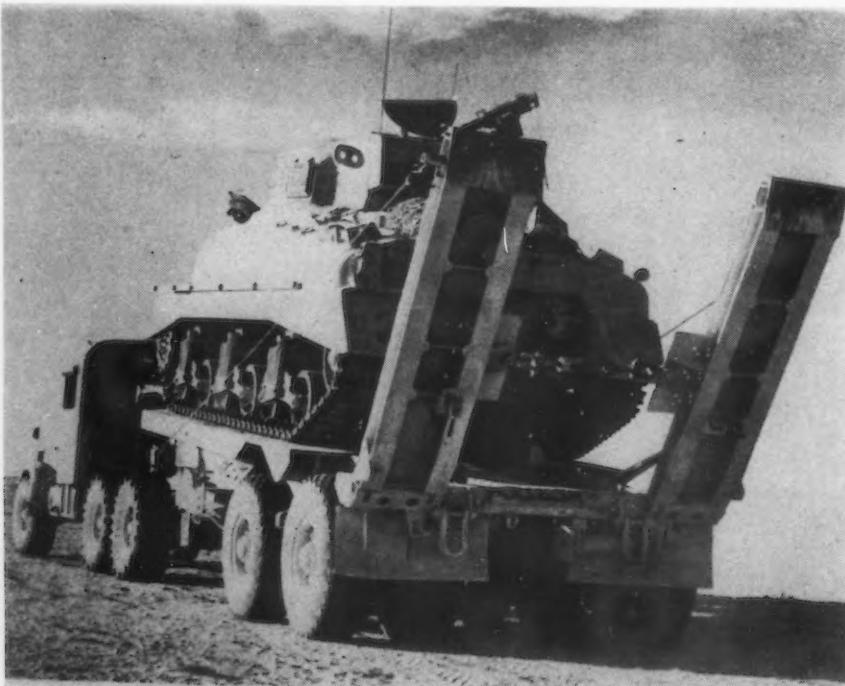
H. K. PORTER COMPANY, INC. PITTSBURGH, PENNA.

*British-Combine Photo*

AMERICAN MISSION: Members of the American Mission of Aeronautical Experts holding a press conference at the British Ministry of Information. The conferees include: Col. J. J. Llewellyn, president of the Board of Trade; T. P. Wright, WPB director of air production; P. G. Johnson, president and general manager, Boeing Aircraft Co.; I. M. Ladd, vice-president and general manager, Consolidated Aircraft Corp.; W. K. Ebel, vice-president and chief engineer, Glenn L. Martin Co.; Chas. Marcus, vice-president, Bendix Corp.; J. Carlton Ward, Jr., president, Fairchild Engine and Aircraft Corp. and Ranger Engineering Corp.; A. T. Hershoff, Chrysler Corp.; Don Welty, general manager, Aluminum Corp. of America; S. A. Stewart, Hamilton Standard Propellers (United Aircraft Corp.); Mr. Thurlle, Parliamentary Secretary of the Ministry of Information.

• • •

SAVES WEAR AND TEAR: This multiple-wheeled colossus is known as a tank recoverer and has been used with success in the Western Desert by the Royal Electrical and Mechanical Engineers both to round up tanks which have been knocked out of action and to transport tanks to the fronts. This method has done much to eliminate putting excessive mileage on tanks in getting to the fighting fronts and has recovered many, otherwise incapacitated, for speedy repair at an equipped depot.

Press Assoc. Inc. Photo

Manpower; Supply Control Seen Going to New Branch

Washington

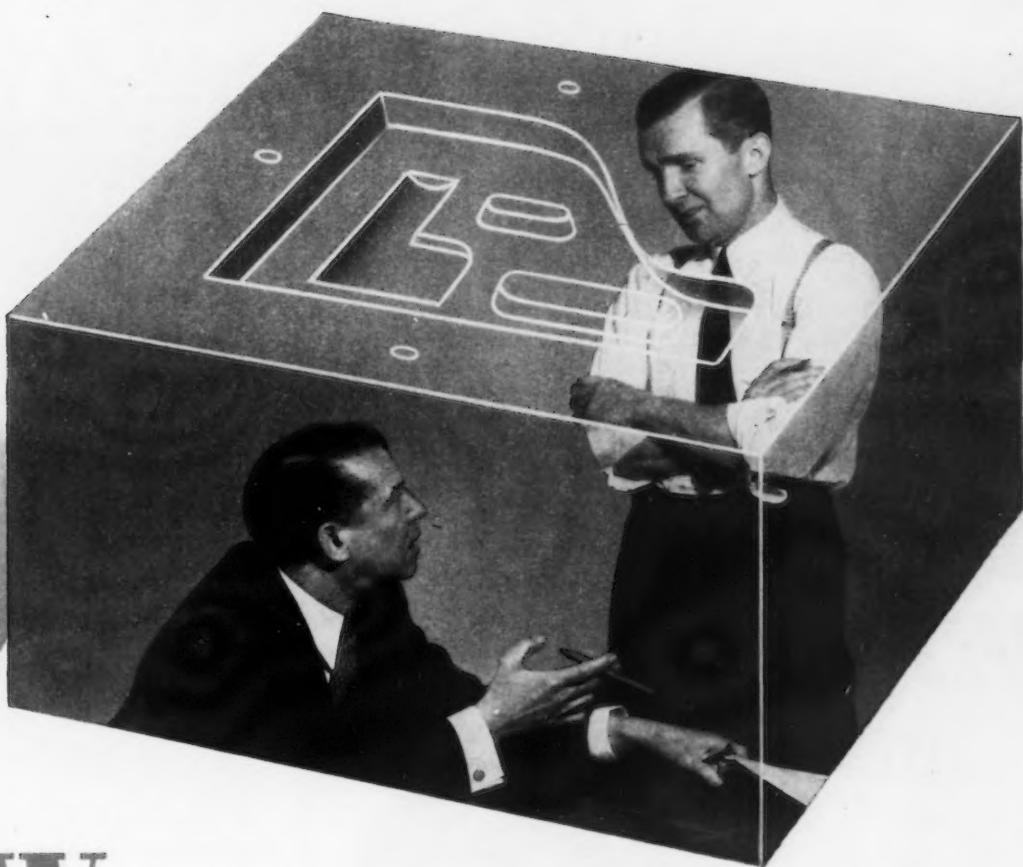
• • • First light was shed last week on a plan said to be under consideration by the President whereby an American equivalent of the British Ministry of Labor and National Supply may be created. The plan centers around the strengthening of the Department of Labor and the appointment of a new Secretary of Labor and of the Interior.

Cabinet changes expected are the transfer of Frances Perkins from Secretary of Labor to head of the Federal Security Administration now headed by Paul V. McNutt. Secretary of the Interior and Solid Fuels Coordinator Harold L. Ickes is said to be considering the post of Secretary of Labor and McNutt is said to be slated for Secretary of the Interior.

To parallel the British setup, the Labor Department is expected to undergo a complete face lifting and a transfusion of the powers of the War Manpower Commission with all its satellite branches having to do with manpower training etc., including the United States Employment Service.

The Presidential directive which was to have revealed the changes has been held up for a few days. Meanwhile Justice Samuel I. Rosenman who worked the plan out according to the President's views made a hurried trip to Washington to confer on some recent details which have arisen and which are the apparent reason for the delay in the Presidential directive. If and when these Cabinet changes are made they will be the first since the coming of the New Deal in 1933.

The chairmen of five Congressional committees, working on manpower and war production, are understood to be seeking an audience with the President as soon as the directive is made public in an effort to stabilize and help develop a complete production procurement and manpower policy. The committees are said to be particularly interested in the problem of civilian control compared with Army control over procurement and flow and control of production. They do not favor military control and consequently are expected to ask for maintenance of WPB and suitable civilian handling of the manpower situation.



"We need more production...per die"
... and LATROBE helped increase output as much as 300%

*This is a war of
METALS*

It calls for conservation and replacement of critical metals. It presents new problems in selection, application and handling of tool steels. You'll find Latrobe Metallurgical Service a vital wartime aid in such cases...we'll gladly help you without obligation!

A large user of die steels, had been using a steel of a particular analysis which for years had given good performance. Yet production had to be increased!

Latrobe's trained metallurgical staff was called upon to provide a solution. Many factors had to be considered, such as toughness,

deformation in heat treatment, ductility possible with high hardness, etc. The answer required diligent application, exhaustive study, patient research.

But the result proved the worth of *Latrobe Metallurgical Service*, for production per die was increased *as much as 300%*.

LATROBE
Metallurgical Service
Latrobe ELECTRIC STEEL COMPANY

MAIN OFFICES and PLANT • LATROBE • PENNSYLVANIA



**CIO-AFL in Dispute at
3 Kaiser Shipyards**

• • • NLRB is expected to stand pat on its decision to hold a hearing Dec. 14 in Portland at which time the controversy between the CIO and AFL over closed shop contracts in three of Henry J. Kaiser's West Coast shipyards will be aired.

The CIO accuses Kaiser of aiding the AFL in recruiting members in these yards and of unfair

practice on the part of the AFL in obtaining a closed shop contract.

Basis of the complaint is that closed shop contracts were accepted by Kaiser with the AFL at a time when one of the yards had no employees and the other two had less than one per cent of the anticipated total of employees. Thus, by accepting the closed shop contract at this time, Kaiser is accused of aiding recruitment of AFL members by practically forc-

ing men to join the AFL to be enabled to work in his already contracted yards. Similarly, it has been pointed out that the Wagner Act sanctions closed shops only after a majority of the employees signify a preference for a particular union.

NLRB is expected to order an election to permit the workers to voice their opinion.

**Enlistments Stopped
For Essential Workers**

Washington

• • • Enlistment in the Army or Navy by essential workers in the aircraft and shipbuilding industries and such employees who have resigned within 60 days from such jobs to enlist, was stopped last week by order of the Army and Navy.

At the same time Maj. Gen. Lewis B. Hershey, director of the Selective Service, ruled that local draft boards should refuse releases to essential employees in these industries who wish to enlist. The new regulations however, have no effect on deferment policies for essential workers.

To guide local draft boards in determining who is eligible for deferment, the War Manpower Commission announced the preparation of a master list containing 3000 of the country's estimated 27,000 essential war jobs, which should be given deferment.

**Batcheller Names 4
Assistant Directors**

Washington

• • • Top moves in the most current shuffle of the WPB Iron and Steel Division include the appointment by Hiland G. Batcheller, Division Chief, of four assistant division directors. Miles K. Smith, chief of the Ferro-Alloys Branch; Frank Vigo, general transportation manager, American Rolling Mill Co., will be assistant director in charge of Materials. Norman Foy, general manager in charge of sales, Republic Steel Corp., will be assistant director in charge of the Controlled Materials Plan. David Austin, vice-president and director of Carnegie-Illinois Steel Corp., returned Dec. 2 as assistant director in charge of the Products Section.

RUGGEDLY BUILT WITH QUICK, CLEAN DUMPING ACTION FOR 24-HOUR CONTINUOUS PERFORMANCE

PSC

INDUSTRIAL CARS

AUTOMATIC AIR DUMP CARS—12 to 50 cubic yard capacities and load carrying capacities up to 90 tons. (50-yard car shown).

DESCRIPTIVE BULLETIN AVAILABLE ON REQUEST

PRESSED STEEL CAR

PRESSED STEEL CAR COMPANY, INC.
(INDUSTRIAL DIVISION)
PITTSBURGH, PA.

"BACKBONE" GIVES THEM
RANGE AND HITTING POWER



"BACKBONE" GIVES THE
MILWAUKEE ACCURACY
AND PERFORMING POWER

Lobbing shells, hour after hour, demands plenty of "backbone" in the big guns that are assigned the task of making enemy positions too hot to hold. Milling tough metals and alloys at high speeds and to close tolerances, hour after hour, isn't quite as spectacular, but the machine that handles the work must have similar "backbone" to withstand the ceaseless strain and vibration.

In milling machines, *rigidity* — an indispensable quality in any machine tool — originates in the column, the backbone of the machine. The column of a Milwaukee Vertical Milling Machine has been engineered for the proper distribution of metal to assure the maximum stability.

A look inside this husky backbone would reveal a horizontal wall, dividing the column into a double box-section. This provides an unusually rigid structure.

It is features like this which have enabled Milwaukee Milling Machines to do more than the "usual" under the stress of wartime production.



KEARNEY & TRECKER
CORPORATION
MILWAUKEE, WISCONSIN



Buy Victory with at least 10% in War Bonds!

Milwaukee MACHINERY TOOLS

NEWS OF INDUSTRY

Ore Shippers Aim At 92 Million Tons

Cleveland

• • • The Great Lakes ore fleet on Monday, Nov. 23, passed the 90,000,000 ton record-breaking iron ore goal set early in 1942 by the government and is now aiming at the new and higher season quota of 92,000,000 tons recently requested by WPB.

All lower lakes receiving docks and furnace yards now are filled to very close to capacity and shipping authorities stated that the fleet was expected to load another 1,500,000 tons this week.

However, shipping received a serious setback toward the latter part of the week from gales that swept across the lakes. Many carriers were brought to anchor behind shelter spots.

The cold snap was sudden and

it is feared that it may be the beginning of the end for the 1942 lake ore movement. A large number of freighters are in the upper lake ports, but prospects of getting them loaded without delays are slim. The past week's shipments are only about one-half of what was expected.

With seasonal insurance rates expiring Nov. 30, the American Syndicate of New York, through regular insurance brokers, has undertaken to insure ships at lower than the regular post-season rates in order to extend the shipping season as long as possible. The American Syndicate, through the War Shipping Administration, is handling the insurance at rates comparable to regular seasonal rates, on ships carrying coal, ore, limestone, and other commodities listed by the War Shipping Administration through the Office of Defense Transportation.



GUN BARREL

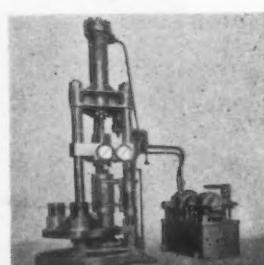
Hele-Shaw Fluid Power
smoothness reduces vibration,
cushions shock, makes
machines last longer

Smoothness—that's one advantage of Hele-Shaw Fluid Power we can get across in few words. You see, Hele-Shaw Fluid Power is simply oil under pressure from a Hele-Shaw pump. It's used to power hundreds of different types of hydraulically driven machines. The Hele-Shaw pump is a rotary, radial, multi-plunged pump. The power it delivers flows smoothly to the driven ram or plunger. Then, too, using oil, the pump and the system, are self-lubricated. The oil also serves to cushion the driven machine or machine-tool against shock. Fluid Power reduces vibration, absorbs shocks, lengthens life of machine, cuts manufacturing time and maintenance. Look up this and other advantages of Fluid Power in the Hele-Shaw Pump Catalog, yours for the asking.

Official U. S. Navy
Photograph



Cross sectional view of the Hele-Shaw Pump showing the multiplicity of plungers responsible for the smooth even flow of Hele-Shaw Fluid Power.



HYDROSTATIC SHELL TESTING PRESS, built by the Baldwin Southwark Division, Baldwin Locomotive Works, Philadelphia. A feature is the individual Hele-Shaw pumping unit, permitting easy relocation of machine.

THE **Hele-Shaw** Fluid Power Pump

OTHER A-E-CO PRODUCTS: TAYLOR STOKERS, MARINE DECK AUXILIARIES, LO-HED HOISTS



AMERICAN ENGINEERING COMPANY

2410 ARAMINGO AVENUE • PHILADELPHIA PA.

Wickwire Spencer's New Propeller in Production

• • • E. C. Bowers, president of Wickwire Spencer Steel Co., announced Dec. 1 that the new Wickwire automatic propeller is going into production. This is a variable pitch, fully automatic airplane propeller perfected by Wickwire engineers after two years of intensive development.

"While the details cannot be revealed," Mr. Bowers explained, "we are at liberty to state that it eliminates the requirement that the pilot change the pitch of the propeller. The Wickwire propeller does not require any auxiliary power, equipment, circuits or manual or governor control. From take-off, through the climb, at all air speeds, at all altitudes, and under any flight conditions, the pitch adjusts itself automatically, instantaneously and smoothly."

"In addition to this automatic feature, the new propeller decreases the take-off distance required and produces faster climb. It is light in weight, simple in structure and number of parts and cheap to produce. The blades are of a special wood construction, a feature which makes it particularly desirable because of current shortages of certain metals."



We are proud to announce the Army-Navy E Award, for high achievement in the production of war materials, has been conferred upon Jessop Steel Company for outstanding contribution to victory.

This achievement has resulted from the combined efforts of every member of our organization and from the

splendid cooperation of many business friends from whom we purchase supplies and equipment.

On behalf of the Jessop personnel we accept with deep appreciation this award and its attendant honor. We shall fly it proudly as a challenge to even greater effort.

JESSOP STEEL COMPANY, Washington, Pennsylvania



JESSOP STEELS

CARBON • HIGH SPEED • SPECIAL ALLOY • STAINLESS • COMPOSITE STEELS

NEWS OF INDUSTRY

Cited for Award

• • • The following plants have recently been selected by the Army and Navy to receive the Army-Navy "E" award for excellence in production:

Athenia Steel Co., Division of National Standard Co., Clifton, N. J.

Cheney Brothers, Manchester, Conn.

Ferris Instrument Corp., Boonton, N. J.

Savanna Ordnance Depot No. 2, Proving Ground, Ill.

Suncook Mills, Suncook, N. H.

United Wire & Supply Corp., Providence, R. I.

A. Schrader's Son, Brooklyn.

Treasury "T"

Lorain Division, Carnegie-Illinois Steel Corp., Johnstown, Pa.

International Business Machines Corp., Plant No. 1, Endicott, N. Y.

MacwhYTE Co., Kenosha, Wis.

Nylon Research Laboratory and Pilot Plant, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Repaund Works, E. I. du Pont de Nemours & Co., Inc., Gibbstown, N. J.

Winthrop Chemical Co., Inc., New York.

Maritime Commission "M"

Whitin Machine Works, Whitingville, Mass.

A. P. Green Fire Brick Co., Mexico, Mo.

Homestead Valve Mfg. Co., Coraopolis, Pa.

U. S. and Canada Set Ore Consumption High

Cleveland

• • • Ore consumption in the United States and Canada surpassed consumption of any month this year, and is probably the highest monthly consumption in the history of the steel industry. A total of 7,598,664 gross tons of ore were consumed during October by blast furnaces and open hearths, 7,370,595 tons of which went to furnaces in the United States and 228,069 tons to Canadian furnaces. In September, 7,139,888 gross tons were consumed, 206,286 tons by Canadian furnaces and 6,933,602 tons by American furnaces.



"J. C." is the head man out in the plant—vice-president in charge of operations. Recently he took another title: Chairman of the Scrap Committee.

He knows that millions of tons of scrap metal are desperately needed in this war. He knows too that superintendents, foremen and workers won't shoulder the responsibility for scrapping unused or obsolete equipment. They think they might need the stuff some time. So "J.C." has taken this responsibility himself.

This is his measuring stick: "If it hasn't been used for 3 months and if someone can't prove that it's going to be used in the next 3, find a use for it or scrap it."

Are you going all-out for scrap as "J.C." and his men are doing—for VICTORY? Remember, the scrap in your plant may save the lives of American fighting men. Remember too that this is not a campaign. It is a continuing effort—a job that must be performed as long as the war lasts. It means new steel for the tanks, guns, ships and planes that will bring Victory. The American Rolling Mill Company, 3371 Curtis Street, Middletown, Ohio.



*TURN IN
ALL YOUR SCRAP*

This advertisement is in support of the Salvage Program of the Conservation Division of the War Production Board.

NEWS OF INDUSTRY

40 Mining Projects Get Federal Funds

Toronto, Ont.

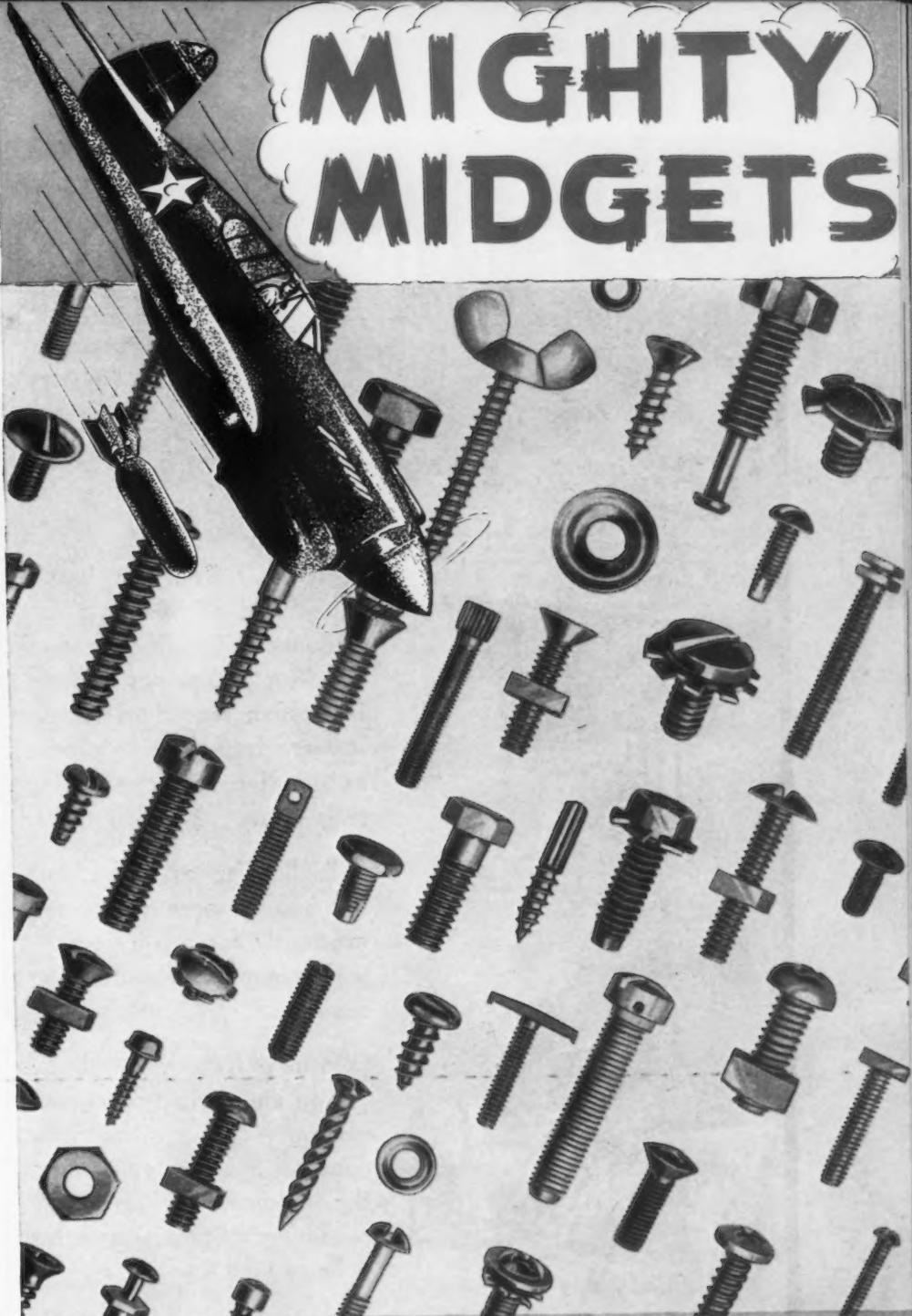
• • • G. C. Bateman, Metals Controller, announced that 40 mining projects for the recovery of strategic minerals in Canada are deriving financial assistance in some form or other from either the Canadian or United States government agencies. Of this total 17 properties will be operated for the account of the Metals Reserve Co., of the United States and production plans call for the recovery of 46,000 tons of copper, 74,000 tons of zinc and 7000 tons of lead. Projects wholly financed and operated by the Canadian government involve magnesium, chromite, molybdenite and tungsten.

In addition, Mr. Bateman stated, metal sales contracts have been arranged for many companies where no financing is needed and other proposals are being investigated which will augment the total. Canadian companies have reported to the call for increased output necessary to effectively prosecute the war, Mr. Bateman stated, and this year the nonferrous metal output of Canada will amount to more than 1,100,000 tons.

As an instance of the tremendous expansion, Mr. Bateman cited the case of aluminum. When present plans are completed, probably in 1943, this country will have the largest single aluminum producing plant in existence, with a capacity exceeding the world's output of the metal in 1937. To provide the necessary power for the operation, a hydroelectric plant is being constructed which will be the largest single hydro plant operating in the world. Its capacity will be 1,000,000 horsepower.

WPB Opens Mobile Office Mobile, Ala.

• • • An office for the Mobile area has been opened at 217 First National Bank Building here by the War Production Board. John A. Miller, New Orleans engineer, has been named area manager, and the office will serve the southern tier of counties in Alabama, northwest Florida as far east as the Chattahoochee and Apalachicola Rivers, and the southeastern counties of Mississippi, including all the Gulf cities and Hattiesburg.



Small offensive weapons have become vitally important in war strategy. Strength, accuracy and striking power supersedes size in many task forces. Like the hard-hitting dive bomber and other mighty midgets of war, HOLTITE Screws, Bolts and allied fastenings perform tasks far out of proportion to their size. Scientifically produced with the uniform precision of small tools these rugged fastenings are used in the assembly of practically all weapons of war to provide time-saving application and faultless, enduring service.

TOP THAT 10% BY NEW YEARS!

We are 100% subscribed
to more than
10% Payroll Deduction



CONTINENTAL SCREW CO.

New Bedford, Mass., U.S.A.
Manufacturers of
Enduring, Fine Precision
SCREWS · BOLTS · NUTS
and Allied Fastenings

NEWS OF INDUSTRY

Steel Committees

To Aid WPB on CMP

Pittsburgh

• • • Advisory committees within the steel industry dealing with the various steel products are operating on call from the Iron and Steel Branch of WPB. The main purpose of these committees is to furnish advice, when requested, to the WPB so as to insure a smooth working of the Controlled Materials Plan when it becomes effective. Actual selections to the committees were made by the WPB. Generally speaking, on each committee two smaller companies and three larger companies are represented. Meetings are held only upon request by the WPB. There appears to be no concentration geographically on the committee personnel and the industry is fairly well represented throughout.

The prime or major advisory committee which is known as the Advisory Committee on Steel Products with the names of the members and those products which have been assigned to each committee member—this man becomes chairman of a separate product committee—are as follows:

R. M. Allen, Allegheny Ludlum Steel Corp., stainless steel; N. J. Clarke, Republic Steel Corp., alloys; Avery C. Adams, U. S. Steel Corp. of Delaware, carbon bars and semi-finished steel; Paul Mackall, Bethlehem Steel Co., plates; L. M. Parsons, Jones & Laughlin Steel Corp., cold finished bars; John Neudorfer,

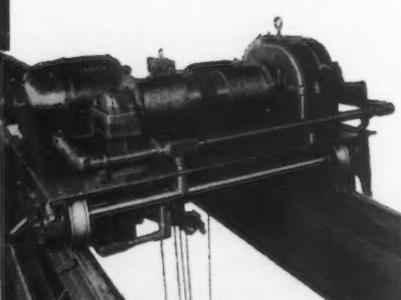
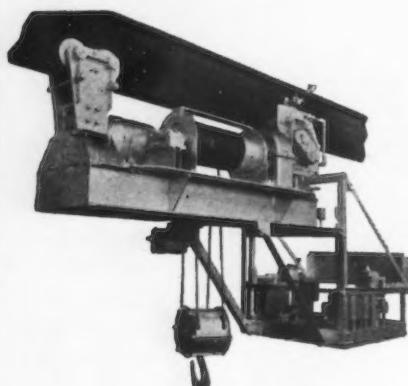
need hoist or crane?

Get a EUCLID PROPOSAL!

EUCLID CRANES are manufactured in capacities from $\frac{1}{2}$ ton to 100 tons and in spans up to 100 ft. One, two, three, four and five motor electric cranes are built for various classes of service—also a complete line of hand power cranes.



EUCLID HOISTS are available in all types and in capacities from 500 pounds to 20 tons; also in special units built to order, to meet special requirements.



EUCLID CRANES & HOISTS

THE EUCLID CRANE & HOIST CO.
1361 CHARDON RD. EUCLID, OHIO

Copies of either or both catalogs will be mailed on request. Write for them.



V-252

Drawn for OWI

NEWS OF INDUSTRY

Wheeling Steel Corp., wire products; W. W. Sebald, American Rolling Mill Co., sheets and strip; J. A. Henry, Weirton Steel Co., tin plate; W. E. Watson, Youngstown Sheet & Tube Co., pipe; A. C. Roeth, Inland Steel Co., rails and track accessories; Isaac Harter, Babcock & Wilcox, tubing, and J. H. Parker, Carpenter Steel Co., tool steel.

This general advisory committee composed of the chairmen of the various steel products committees has already held meetings and submitted data to WPB on the current production-distribution picture. This committee acts in an advisory capacity only and is subject to call only by WPB.

Trade Notes

Hydraulic Machinery, Inc., has begun a new plant at 12801 Ford Road, Dearborn, Mich., where will be combined activities now undertaken in two plants in Detroit. The factory is a monitor-type building with craneway giving the maximum of overhead clearance, adapted well to the handling of big castings involved in special and hydraulic machinery produced by the company.

The 17,500 sq. ft. of floor space when equipped will increase the capacity about 75 per cent.

Hydro-Arc Furnace Corp. has opened a new manufacturing plant at 561 Hillgrove Avenue, LaGrange, Ill.

George A. Starbird has moved to 950 North Highland Avenue, Los Angeles.

Eicor, Inc., manufacturer of rotary electrical apparatus, has moved to a new Defense Plant Corp. building at 1501 West Congress Street, Chicago.

Ramon Salo, 51 Madison Avenue, New York, formerly manager of the technical divisions of M. Castellvi, and Vandervoort & Goepel, is now exporting machinery, industrial equipment and metals to Latin America.

The Buckeye Portable Tool Co. of Dayton, Ohio, announces its change in name to Buckeye Tools Corp. There has been no reorganization or change in its management, administrative staff, or products.

Jerry M. Marks, who formerly operated a warehouse for special steels at 261 Greenwich Street, New York, has become a technical analyst in the stainless steel division of WPB's Steel Recovery Corp. at Pittsburgh.

Philadelphia Lawn Mower & Mfg. Co. have moved their entire plant and offices to 18th and Courtland Streets in Philadelphia.

Detroit Universal Duplicator Co., Detroit, announces it has taken over the former Ethyl Gasoline Corp. plant at 728 Milwaukee Ave., Detroit. The new plant, occupying a square block, will permit increased production of the company's duplicatives, machine tool control device sold to war plants.



Can you use a steel tape that cuts red tape... or a special shape that saves precious machining time... or a round wire brought to readiness for final fabrication? That's how Roebling can help you... by supplying the right wires, made to exacting specifications of steel analysis, dimensions and finish... and getting them to you on schedule!

Roebling Flat Wire for Bomb Flare Clips is typical of countless minor masterpieces of wire-making that are rolling out of the Roebling mills today. And they get to the battlefield faster because they require a minimum of handling and finishing on the production front... minimize scrap and reject losses in the bargain.

If specialty wires can do a job for you, call on Roebling's long experience in meeting specifications that require close adherence to physical and chemical requirements. With special facilities to handle this type of work and the trained personnel to give it the close attention to detail it demands... we're ready and able to go to work on your problem. Prompt action on war orders.



JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY · Branches and Warehouses in Principal Cities



SAVING MINUTES where minutes count!

IN the arsenals of war production, "Yankee" Fine Mechanics' Tools save time, work, trouble and money — not merely because good mechanics use them, but primarily because the pre-determined ingenuity of these tools makes good mechanics better! They speed up production because they are *made for speed* . . . because they are designed to do their jobs fast and with ease.

Behind "Yankee" Tools are more than a half century of precision manufacture, accurate testing and a determination to produce true quality and dependable performance. Perhaps this is why war-time demand is now so much greater than our capacity to produce.

We'll do our best to meet your needs. You can help us by providing priority ratings whenever possible. Order from your supply house or write to us . . . c/o Dept. IA 12.



"YANKEE" VISES
Four Handy Sizes with Swivel Base. V-block holds round stock securely.

"YANKEE" TOOLS
make good mechanics better
North Bros. Mfg. Co., Phila., Pa., U. S. A.
Established 1880

Alcoa Women's Wages Threaten Strike Vote

Pittsburgh

• • • A strike vote was threatened by Local No. 2 of the Aluminum Workers of America for Friday, Dec. 4, if women workers of the Aluminum Co. of America New Kensington (Pittsburgh district) plant were not paid equal wages with men, according to John Haser, business agent of the union.

The dispute centered around the union's contention that women workers recently put on the 11 to 7 shift were doing men's work and should therefore receive equal wages. The union charged the women were receiving 72c an hour compared with 87c for the men. The company spokesman stated that the women were doing work never before done by the men.

Dr. John R. Steelman, head of the Conciliation Service of the U. S. Department of Labor, assigned Commissioner Charles R. Ward to the case.

Nick A. Zonarich, international president of the union, said that he was trying to straighten out the matter without interrupting production.

Pay Leveling Asked By CIO in South

Birmingham

• • • Noel R. Beddow, southern director, United Steelworkers of America (CIO), announced here Nov. 25 that the union would make a Southwide fight to remove the differential in pay for common labor in steel and closely allied industries.

Beddow asserted that the district and regional organizations of the union would be joined by the international union in carrying the fight to the National War Labor Board. The rate of pay for common labor in the South, he said, is 60½ cents an hour as against 78 cents in the North.

The southern director of the union said the following telegram was sent to the Tennessee Coal, Iron & Railroad Co., whose steel operations are the largest in the district:

"Pursuant to understanding arrived at in collective bargaining conferences between representatives of company and representa-

tives of United Steelworkers of America which led to conferences of present agreement between your company and union, I hereby advise that the union desires to take to the National War Labor Board the issue of unjust wage differential which now prevails between the workers at the steel plants of the Tennessee Coal, Iron & Railroad Co. and the other subsidiaries of the United States Steel Corp., which issue was left unresolved in our collective bargaining conferences."

Beddow asserted to newspaper men that "removal of the differential, even in part, would mean millions of dollars annually to the steelworkers of the South, and would correct an inequality for which, so far as we can determine, there is no justification whatsoever."

Lake Coal Carriers Urged To Extend Shipping Season

Cleveland

• • • Coal producers and ship operators were urged this week to continue moving coal by Great Lakes carriers as long as possible after the official closing of the lake shipping season on Nov. 28, in order to supply Great Lakes areas with sufficient coal to meet this season's requirements and relieve the burden on rail transportation.

To Nov. 15, water carriers had moved 45,703,645 tons of coal on the lakes as compared with 47,238,819 tons during the same period of 1941. The reduction, caused by diversion of vessels from carrying coal to iron ore, threw an added weight on the rail shipping facilities. While statistics of combined water and rail coal shipments into the area are not available, it is believed a new high record as to the total amount of coal shipped into the Great Lakes region has been set.

Increased premiums on lake ship insurance, usually a deterrent to post-season navigation by owners who are not self-insured, has been taken care of by the War Shipping Administration. The War Shipping Administration has agreed to re-insure coverage issued by commercial syndicates at regular rates, through a New York insurance firm, American Syndicates.



Each new star added to "Old Glory" was a symbol of vast accomplishment and new and greater responsibilities. How well our American forefathers met their challenge is a story held in world-wide respect. . . . Today, a star added to the distinguished joint award—the Army-Navy "E"—signifies continuous production accomplishment and new incentive in the traditional American way. . . . We proudly add our first star . . . fully aware of our increased responsibility as full partners with our fighting men.

WYCKOFF DRAWN STEEL COMPANY

FIRST NATIONAL BANK BLDG.
PITTSBURGH, PA.
3200 SO. KEDZIE AVENUE
CHICAGO, ILL.

Manufacturers of Carbon and Alloy Steels . . . Turned and Polished Shafting . . . Turned and Ground Shafting . . . Wide Flats up to 12" x 2"

NEWS OF INDUSTRY

Canada Will Pool Its War Production Secrets

Ottawa

• • • C. D. Howe, minister of munitions and supply, announced that Canadian war production secrets designed to save materials, machines and manpower will be pooled for the benefit of all war industry in this country through a special committee working under H. J.

Carmichael, Production Coordinator. The committee will handle details of the nation-wide industrial conservation drive opened last month at the meeting of 1500 munitions production men in Toronto. The program, urging simplification of design, streamlined production techniques and critical materials substitution, already is effecting savings of \$155,000,000 a year.

Mr. Howe stated that this con-

servation drive is vital to our war production program. "We have acute raw material problems to solve, especially in metals, if Canada's vast munitions output is to be maintained. The conservation exhibit at the Toronto meeting was a revelation to everyone who saw it." He stated that he was constantly impressed by instances of ingenuity in Canadian war production whereby critical raw materials are being replaced by other commodities. New designs and production methods also are releasing critical machine tools and labor for other tasks. "Now that Canadian industry has seen what can be done, the response has been emphatic. Inspection standards are not being lowered and we expect to see output and quality maintained. The Department of Munitions and Supply will give all possible cooperation," Mr. Howe stated.

The Conservation Committee, under the chairmanship of C. B. Stenning of the sub-contract division of the Production Coordinator's office, will be composed of representatives of production branches and control divisions. Conservation methods developed in any one plant or any specific branch of war industry will be made available through the committee to Canadian war industry as a whole wherever they can be applied successfully.

Canada's economy drive to save materials, man-hours and money in providing war equipment is bringing results. On existing contracts for accessories for machine guns, rifles and other small arms, a saving of more than \$4,100,000 already has been achieved. The majority of these contracts expire at the end of 1943.

**Government Requisitions
Four More Lake Vessels**

Buffalo

• • • The War Shipping Administration has requisitioned the four remaining vessels of the Great Lakes Transportation Corporation's fleet. They are the George D. Dixon, Fred W. Sargent, Alfred H. Smith and Utica. For ten ships previously delivered, \$1,900,000 was agreed upon as the settlement price. The vessels are Great Lakes package freighters and auto carriers.

ZAGAR INDEXING AND HOLDING Fixtures

SOLVE REALLY Tough APPLICATIONS AND JUMP PRODUCTION

Using Zagar Indexing and Holding Fixtures, you need not provide a special fixture for every job. With them, you can handle a wider range of work more easily, quickly and profitably. For milling, tapping, slotting and grinding operations. For holding only or for indexing and holding; 1" and 2" sizes in both types.

1 Index Fixture (2"), with master collet and pads, milling wrench squares with all standard equipment.

2 Holding Fixture (1"), mounted on face plate of grinder, grinding small bushing with a 5/8" hole to tolerances of .001" diameter and .001" run-out.

3 Index Fixture (1"), mounted horizontally, using index lock and standard collet. Short order called for pipe-tapping 200 pieces. Set-up time 15 minutes; no special tools required.

4 Special set-up. 1" Index Fixture serving for indexing only, without collet. Part fastened into fixture with "C" washer. Concentricity and size to airplane tolerances.

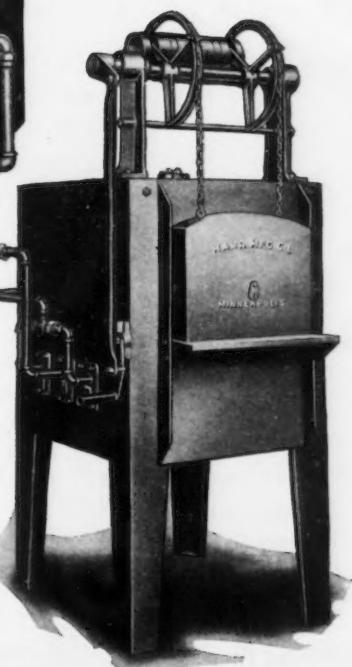
Ask for our new 8-page illustrated Bulletin "I"

ZAGAR TOOL, INC.
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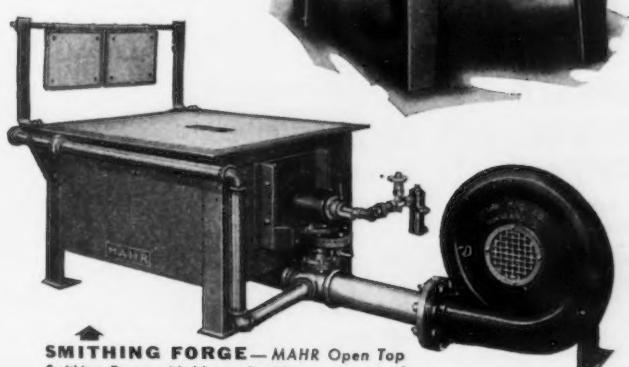
POT FURNACE

MAHR Standard Pot Furnace with hood for cyanide, etc. Made in many sizes and types, including rectangular type for molten bath. These furnaces are specially designed for longer pot life—often as much as 25% to 50%!



TOOL FURNACE

MAHR Standard Tool Furnace. Under fired to 1800° F. for regular tool steels. Over and under fired to 2600° F. for high speed tool steels.



SMITHING FORGE

MAHR Open Top Smithing Forge with blower furnishing primary and secondary combustion air, and air for air curtains.

"Where do you
get the POTS
for your
FURNACES,
Mr. Barstow?"



That question was recently asked of our Mr. W. G. Barstow by an executive of a large aviation manufacturer. Here are the facts:

The pot in the particular MAHR furnace used by this manufacturer had been in operation for six years before it needed repair. After repair, it had been operating a year. The executive naturally considered that the pot was made of some wonderful material. Actually, it was made of ordinary boiler plate! The reason for its long life, as Mr. Barstow showed, is the unusually successful MAHR method of firing. In view of this incident, it would be trite to say this man appreciates the value of MAHR Furnaces.

For over a quarter century, MAHR has built furnaces on the premise that "there is NO substitute for quality and sound engineering". Perhaps, on occasion, a MAHR Furnace may cost a trifle more. But if the engineered performance-ability gives longer life and higher quality of production, a far greater additional cost would be well justified.

Ask us for the names of MAHR users over the years. Ask us also about the type of furnace YOU need. See the list of types in box. A MAHR Engineer can help you on any heat treating problem—wire, write or phone today.

Sales Offices in Principal Cities

MAHR MANUFACTURING CO.

DIVISION OF DIAMOND IRON WORKS, INC.

1703 North Second Street • Minneapolis, Minnesota

LEAD POTS

MAHR Lead Pots in hard use in a large battery manufacturing company's plant.



**MAHR
FURNACES**
FOR EVERY
HEAT TREATING
NEED

Annealing
Carburizing
Baking
Hardening
Forging
Drawing
Stress Relief

Furnace Types:
Car Bottom
Pit
Pusher
Roller Hearth
Continuous
Pot
Rotary

**Other MAHR
Equipment:**
Rivet Forges
Torches
Burners
Blowers
Valves
Smithing Forges

**Tool and Die Workers Face
Maximum Pay Decision**

Detroit

• • • Establishment of a maximum wage rate scale for more than 50,000 tool and die workers in this area was recommended this week by William E. Simkin, special WLB representative, as a means of stopping labor piracy.

The recommendation, if adopted, would bring all the jobber shops and the manufacturing plants in

the six county metropolitan area employing tool and die workers under the ceiling rates fixed by the board Oct. 16, for 65 independent shops and the captive shops of G-M, Chrysler and Ford.

The board's previous order did not cut the rates of those receiving more than the maximum but prohibited employers from hiring new workers at wages higher than the ceiling or increasing their own employees' rates above the limit.

**A Mechanized
METAL CRAFTSMAN!**

• Here's truly a production giant, built to take on the toughest metal fabricating assignments. Designed for ease of control—and unfailing accuracy plus speed of output, Buffalo Universal Iron Workers are enlisted throughout Industry to help win the Battle of Production.

**BUFFALO
FORGE
COMPANY**
492 BROADWAY,
BUFFALO, N. Y.
Canadian Blower &
Forge Co., Ltd.,
Kitchener, Ont.

PUNCHING . . . SHEARING
SLITTING . . . COPING . . . NOTCHING
of
ANGLES . . . TEES . . . CHANNELS
I-BEAMS . . . ROUNDS . . . SQUARES
FLATS . . . PLATES

"Buffalo"
UNIVERSAL IRON WORKER

**Cruise Ship Becomes
Training Carrier**

Buffalo

• • • The job of converting the \$3,500,000 Greater Buffalo, Great Lakes cruise ship, into a training aircraft carrier is nearing completion, according to Commander Edward A. Eisele, USN, supervisor of shipbuilding at her dock. The big sidewheeler's stateroom decks have been replaced by a flight deck, supported by scores of rugged steel supports. Her three smokestacks have been shifted to one side, and she has been renamed the USS Sable. The new carrier will go into service next season. The USS Wolverine, formerly the sidewheeler Seeandbee, was converted earlier this year and is operating "somewhere on the Great Lakes."

**Independent Unions
In Jersey Will Unite**

Paterson, N. J.

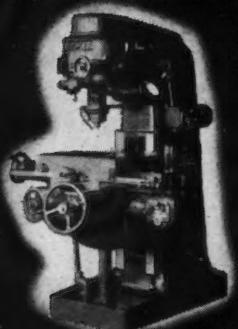
• • • Representatives of independent unions in northern New Jersey acting for about 165,000 workers voted this week to form a state-wide federation of independent unions. The purpose of the new organization was reported to be "for self-protection against the raids of nationally affiliated unions and to help the independent unions get the recognition of government labor agencies."

The organization will be set up formally Dec. 4, at a meeting to be held in the Newark headquarters of the Western Electric Employes Assoc. No reason was given for not joining the new Confederation of Independent Unions, recently organized in Chicago, instead of forming a new organization founded on the same principles.

**C. F. & I. Traffic Manager Is
New WPB Transportation Chief**
Washington

• • • E. G. Plowman, Denver traffic manager of the Colorado Fuel & Iron Corp., was named chief of the newly established Transportation Section of the WPB Steel Division on Monday in a move to eliminate wasteful transportation practices in the steel industry. The appointment was made by H. G. Batcheller, Director of the Steel Division.

Machines, Accessories
and Attachments for a
Wide Variety of Needs:



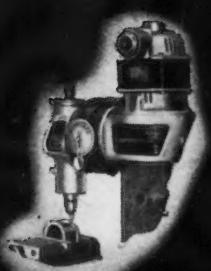
Rotary Head Milling
Machine



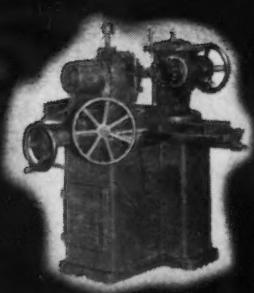
Autometric Jig Boring
Machine



Milwaukee Midgetmill



Milwaukee Speedmill



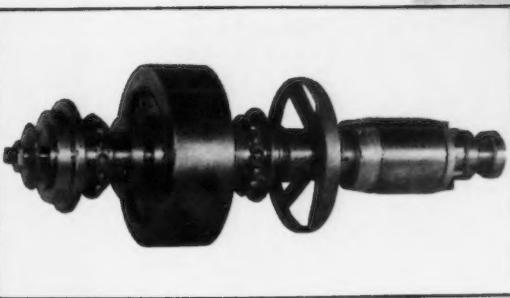
Milwaukee Face Mill
Grinder



Center Scope

THE MILWAUKEE FACE MILL GRINDER GIVES YOU **ALL THREE!**

- ① UNUSUAL RIGIDITY**
- ② REDUCED SHARPENING TIME**
- ③ ACCURACY TO WITHIN .0002 PER INCH**



The three-bearing spindle rotates at 3,400 R.P.M. and carries a heavy flywheel, the inertia of which when in motion successfully keeps the abrasive wheel up to grinding speed. Sharpening time has been considerably reduced as a result.

THE basic design of the Milwaukee Face Mill Grinder embodies strength, precision, and capacity. It is capable of sharpening Tungsten Carbide Cutters ranging from 3" to 16" in diameter — grinds the blades to within .0002 per inch.

Set-ups are quickly made with graduated dials, facilitating adjustments. Other controls are handily located for simplified operation.

**Reject the Source of the Error
... not the Finished Product
... Use CENTER SCOPE!**

The Center Scope is an optical locating machine shop tool, constructed for use on any machine from jig borers to bench drills. No technical knowledge or training is needed to use it. It is a necessary production tool — necessary today because you are interested in saving time — tomorrow, because you will be interested in saving cost.

KEARNEY & TRECKER PRODUCTS CORPORATION • Milwaukee, Wisconsin



Built in various models;
variable and rotating
Center Scope priced at \$97.00, with taper shank,
\$125.00; Special Center Scope, \$125.00 — Edge Block,
\$23.00 additional.

Write Department CS, for complete information.

**Kearney & Trecker
Products
CORPORATION**

Subsidiary of Kearney & Trecker Corporation

NEWS OF INDUSTRY

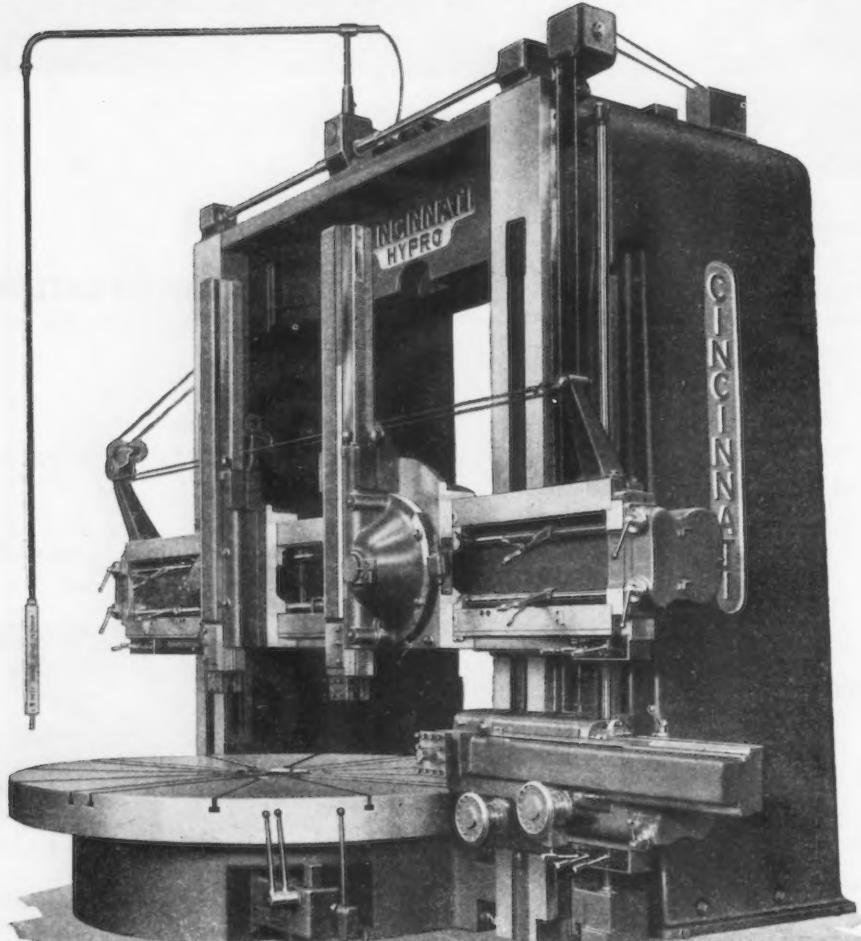
Rolling Steel Door Covers Wall of 7-Story Building

• • • An unusual door installation, consisting of a huge steel rolling door covering almost the entire rear wall of a seven-story building, has recently been completed by the Kinnear Mfg. Co., Columbus, Ohio. This large doorway was designed and built for a specially constructed building in which a 120-ton overhead crane, used in hoisting and moving heavy trans-

former units, had to pass through the opening. When opened, the door coils into a compact cylinder in a small housing on the roof of the building.

A useful safety device is the air-containing weather strip placed at the bottom of the door. This feature, by pneumatic action, automatically halts or reverses the descending door instantly if it contacts any object in its downward path.

Cincinnati HYPRO VERTICAL BORING MILL



Write for Bulletin 175 describing this 10' Mill.

PLANERS • PLANER MILLERS • BORING MILLS

THE CINCINNATI PLANER CO.

CINCINNATI, OHIO



BRITISH STUDY WELDING: The British Purchasing Commission has shown great interest in our applications of welding to shipbuilding practice. Here, one of its representatives, Frederick C. Cocks (left) and R. M. Alvord, vice-president of General Electric are shown as they inspect shipbuilding operations on the West Coast.

**Electrical "Specs" Restricted
Toronto**

• • • Department of Munitions and Supply has announced that Canadians cannot place a purchase order for a machine tool which calls for special electrical specifications without prior approval of the Machine Tool Controller.

Old Pipe to Be Dug Up

• • • K. F. Tennison, of Allegheny Ludlum Steel Corp., was advised by E. A. Longgood, of Northern Indiana Public Service Co., Hammond, Ind., that his company has worked out the salvaging for scrap of 50 tons of old piping which is lying underground on the vacant site of an old abandoned plant.



Scrap salvage is a vital factor in the war effort. To be fully effective a scrap program must include methods for segregating and conserving critical alloying elements so urgently needed in the construction of tanks, guns, ships and planes.

Ferrous and non-ferrous metal scrap should be collected in separate containers at the machine where they are generated. Each class of high-speed

tool steel and each type of constructional alloy steel should likewise be kept separate so that the alloy content can be returned to service.

Remember, — alloy scrap which is segregated, classified and labeled according to type and composition is a vitally important commodity today—and urgently needed to augment primary supplies of Nickel, molybdenum, tungsten, etc.

The metallurgical experience of our technical staff is available to aid you in these and other phases of metal salvage.

KEEP SCRAP MOVING INTO WAR PRODUCTION!

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET
NEW YORK, N. Y.

New Alloy Agents Improve Hardenability of Steels

• • • Details of five new "blended hardeners" for steel, alloy addition agents containing a minimum of critical materials and destined to play a dual role in the conservation of the nation's diminishing stocks of critical alloy metals, were released in a report issued Nov. 24 by the American Iron & Steel Institute.

The five "hardener" agents may

be used interchangeably, in accordance with manufacturer's di-

A complete report on these alloys appeared in the article "Boron," THE IRON AGE, Nov. 19, 1942.

rections, to benefit all lean alloy steels and medium and high carbon steels. Each appears to improve hardenability and strength without undue sacrifice in ductility in very much the same manner as do the conventional alloying

elements such as chromium, molybdenum, etc.

Except for small percentages of aluminum, the new agents contain no critical materials. Boron is present in each, and four of the five utilize, in addition to boron, one or more of the following elements: calcium, manganese, silicon, titanium or zirconium.

The most spectacular result of the committee's investigation, which was undertaken some months ago at the request of the War Production Board, was the discovery that these new agents have an ability, as yet unexplained, to intensify or "pep up" performance of certain of the lean alloy steels to the point where they are equal to other steels of much higher alloy content.

The precise chemical reaction involved is not yet clearly understood, but this intensifying factor will permit manufacturers to reduce substantially the production of these higher alloy types, since the "pepped-up" steels can effectively meet most of the performance specifications required. This, in turn, will naturally cut down on the amount of alloying elements now consumed in the production of alloy steels, and assist in promoting the National Emergency steel program.

But an even more direct saving is anticipated. Substitution of non-critical materials for a portion of the critical metals commonly employed as alloys will free the latter for uses in which they are absolutely vital.

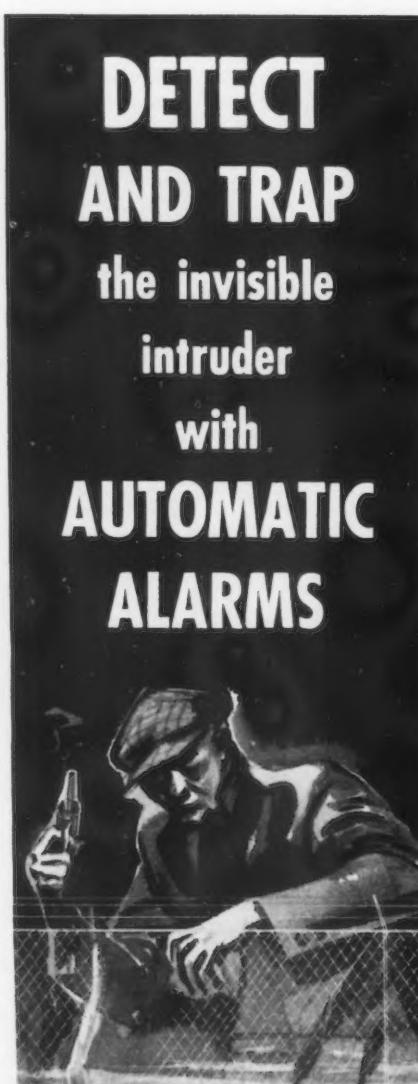
Chicago November Construction \$6.3 Millions

Chicago

• • • Industrial developments in the Chicago area in November amounted to \$6,367,000, according to the Chicago Association of Commerce. These developments included the establishment of a new plant for Bendix Aviation Corp. and extensive alteration and additions to the Chicago plant of Ford Motor Co.

Total new construction and expansions in Chicago for the first 11 months of 1942 amounted to \$556,099,000 as compared with \$303,601,000 in the comparable period of 1941.

No night is so dark . . . no storm, fog or blackout so impenetrable . . . that saboteurs, spies or thieves can, without detection, invade industrial properties and plants protected with a modern system of A.A.I. Automatic Alarms. It is not necessary that the intruder be seen. His presence is discovered and reported by tiny robot sentries, or sound detectors, attached at intervals along protective, industrial fence lines. Sound vibrations, converted into both visible and audible signals, give instant warning of danger and direct station guards to the actual zone of disturbance. Industrial patrol duty that would require hundreds of guards and incur great expense in protecting miles of fence line, can now be done more efficiently and more economically by A.A.I. Automatic Alarms. Important industries, large or small, should be surrounded by this protection.



Write for Literature
AUTOMATIC ALARMS Incorporated
831 Market Street YOUNGSTOWN, OHIO, U. S. A.
Licensed under DuPont and Astatic Patents

THE STATEN ISLAND FERRY

never was like this!



Official U. S. Navy Photograph

• It's a ferry, right enough. But a swift, powerful, streamlined model—a landing boat designed to take our fighting men from ship to shore in a hurry. And to get 'em there dry-shod, ready for action against the enemy.

Today, America's peacetime builders of pleasure craft, like The Matthews Company, are turning out these specially designed landing boats on schedules that call for more today than yesterday, more again tomorrow. And here, as in practically *all* war production, DeVilbiss Spray Equipment is on the job, saving precious time on the painting operations that fit each boat for the rigors of tropical or arctic ocean service.

Mention any type of war or cargo ship, gun, plane, tank or munition—and you'll find that somewhere a DeVilbiss Spray System is helping to paint it *faster*, to get it where it's needed *sooner*!



Your part of America's war job—if it involves a coating, painting or finishing operation in the building of weapons, ships, camps, plants or the application of blackout or camouflage—can be done better in less time with DeVilbiss Spray Equipment.

THE DEVILBISS COMPANY • Toledo, Ohio

Canadian Plant: WINDSOR, ONTARIO

• • •

THE COMPLETE DEVILBISS LINE CONSISTS OF: Spray finishing equipment • Automatic coating machines • Tanks for spray materials • Spray booths and exhaust fans for vapor and dust elimination • Air regulators, cleaners and dusters • Air compressors • Respirators • Specialized hose for paint, air, water, gasoline, welding and pneumatic tools • Hose connections • Water and oil guns • Equipment to prevent offset in printing • Paint strippers • Medicinal atomizers.



DEVILBISS SPRAY SYSTEMS

Greater Bessemer Use Limited by Metallics

Pittsburgh

• • • The recent flurry of interest in bessemer steel production has brought to the forefront again certain factors which have determined bessemer steel output since the war began. The comprehensive questionnaires which were sent out recently by the War Produc-

tion Board it is believed fairly well reiterated what the steel trade has known for some time. However, a statement by Hiland G. Batcheller, chief, WPB Iron and Steel Branch, in which he urged a greater use of bessemer steel in those applications where it is satisfactory, is expected to put emphasis on the search for additional bessemer applications.

Steel men for some time have maintained that bessemer steel

production was being pushed to the maximum consistent with the availability of metallics as well as available and accepted applications. The failure of bessemer ingot output to reach or exceed 80 per cent of rated capacity in the past several months has been due to the lack of sufficient pig iron or scrap and also to the fact that high priority steel orders involving war material are preponderantly in the open hearth steel classification.

There are many applications where bessemer steel is just as satisfactory as open hearth steel and steel companies marketing bessemer output have, for some time, been pointing out these possibilities. One large company convinced the railroads that many parts of freight cars could be constructed from bessemer steel and this application is fairly well known throughout the railroad industry. On the other hand there are a considerable number of applications where bessemer steel

AMP CO CASE HISTORIES

times more production

with AMPCO dies

Wooden dominoes and building blocks — familiar and homely games of childhood — must be economically made for mass consumption. Once steel dies formed 200,000 blocks before the dies had to be replaced. Then dies of "Ampco" bronze were tested and production leaped to 1,000,000 before replacements. Ampco Metal lasted five times longer.

While Ampco dies undoubtedly cost more than the original steel, their longer life made the final cost very low. Ampco bronzes give full value — become a sound investment. . . . Investigate Ampco Metal yourself. Ask for Catalogue 22.

AMPCO METAL, INC.

DEPARTMENT IA-12

MILWAUKEE, WISCONSIN

AMPCO
METAL

THE METAL WITHOUT AN EQUAL

GUADALCANAL RELIEF: This is the first picture released of a soldier on Guadalcanal. This strategically important island, once held by the Marines alone, has now been reinforced with Army men. This soldier, shown dragging his duffle bag over the sand, was among the first to arrive.

Press Assoc. Inc. Photo

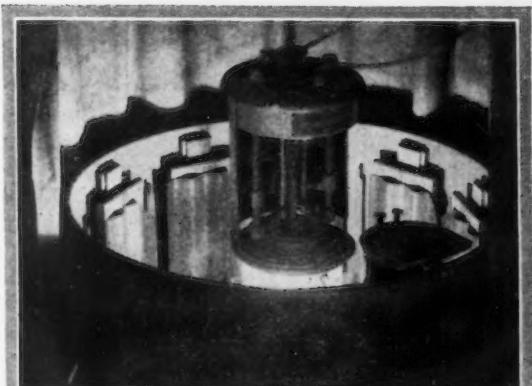


Weather-Tested

against {

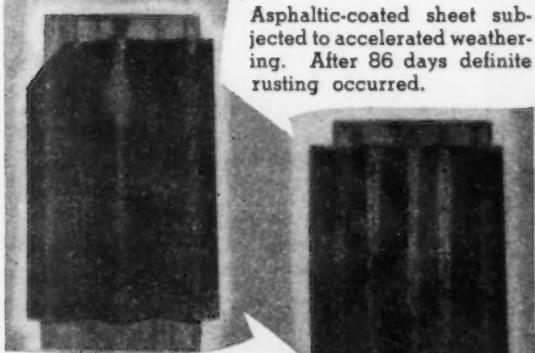


ACID FUMES



WEATHER-TESTED FOR EXTREMES — Here, in the Weather-Ometer, A P S panels were exposed to arc-light at temperatures up to 140°F., and then tested in cold-box at 10°F. below zero!

Asphaltic-coated sheet subjected to accelerated weathering. After 86 days definite rusting occurred.



Regular A P S sheet subjected to 135 days' accelerated weathering. No checking, cracking or failures of any kind were found, only a slight dulling of the coating.

Triple Protection

- 1 Steel protects the structure
- 2 Weather-Tested compound protects the steel
- 3 Mica protects and reinforces the Weather-Tested compound

A P S

ROOFING • SIDING • FLASHINGS

The wide acceptance of A P S Roofing, Siding and Flashings is indicated by the large number of outstanding industrials who have bought it repeatedly for uses under the most extreme corrosive conditions.

A P S Sheets have been *Weather-Tested* by Pittsburgh Testing Laboratories, and the results prove the value of the *Weather-Tested Coating*, an exclusive feature of A P S.

Get our latest *Engineer's Handbook*, illustrating and describing the tests as well as giving useful information

PROTECTED STEEL PRODUCTS CO.

National Distributors for A P S Roofing & Siding

33 Pride St., Pittsburgh, Pa.



Send for this
Engineers Handbook

NEWS OF INDUSTRY

would be satisfactory, but the time involved necessary to change specifications would be quite extended under present war conditions.

The whole problem of bessemer steel production, the balance between it and open hearth steel output, and the availability of applications is one which is probably best known by steel companies having both bessemer converters and open hearth furnaces. For instance, H. W. Graham, director,

metallurgy and research, Jones & Laughlin Steel Corp., feels that the proper distribution of metallics available to the steel industry is probably better understood by operators at individual plants than by any other group.

Authorities, such as Mr. Graham, agree that the production of bessemer steel is definitely limited by the metallics available, but also do not deny that there are still many applications where bessemer steel

cannot produce the same results for a given job as open hearth steel.

Many plants are watching the balance between bessemer output and open hearth very closely, and recently the precipitous drop in orders for concrete reinforcing bars has made it difficult to find outlets for the bessemer steel which formerly went into those channels. There are definite limitations in the extent to which ordnance specifications can be changed to permit the use of bessemer steel instead of open hearth steel. However, at the same time it is believed that an exhaustive search and concentration on the subject would probably turn up additional bessemer applications which are not now being made.

Steel companies with bessemer steel problems on their hands are hard put to find an overall production pattern which will utilize the full output of their existing bessemer facilities. This is all the more true in view of the constant changes in total steel demand because of daily changes at the war front. The sum total of recent statistical data on the outlook for bessemer steel consumption seems to indicate that everything is being done that can be done in view of the metallics and the distribution situations, although it is argued that more education on the problem, such as Batcheller's statement, might help conditions considerably.

A SLOGAN A DAY KEEPS: Slogans are playing a great part on our production front. Here is how it's done in the Harnischfeger Corp., Milwaukee, where giant streamers ride with every crane. Production results and good tool life have shown the success of the plan.

Stuart Oil Products

Commandos of Industry!

Stuart's Thred Kut
HEAVY DUTY CUTTING OIL
Recommended by America's leading machine tool builders

Stuart's CODOL
LIQUID GRINDING COMPOUND
Meets every test for the ideal Modern Grinding Compound

Stuart's "SUPER-KOOL"
AMERICA'S FIRST TRANSPARENT SULPHURIZED CUTTING AND DRAWING OIL

Stuart's SOLVOL
LIQUID CUTTING COMPOUND
For carbide tools and where an "aquamix" solution is recommended

Stuart Oil Engineering
Goes with every Barrel

For All Cutting Fluid Problems

D. A. STUART OIL CO.
Chicago, U.S.A. • LIMITED • Est. 1865
Warehouses in All Principal Metal Working Centers





**For boring of steels . . .
use KENNAMETAL*
single point tools**

Tom the foreman says:

**KENNAMETAL* Eliminates
Multiple-Blade Cutters**

"We have found in our shop that since the advent of KENNAMETAL, multiple-blade cutters are no longer necessary to bore steel and we feel it our duty to pass along this production discovery to all plants which are boring steels on war jobs.

"Many shops are still using the antiquated multiple-blade type cutter inherited from the days of tungsten steel boring tools.

"When carbide cutting tips came into existence, shops eliminated the old boring tool design. They failed to realize that a KENNAMETAL tip need not share the cutting load with a number of other blades.

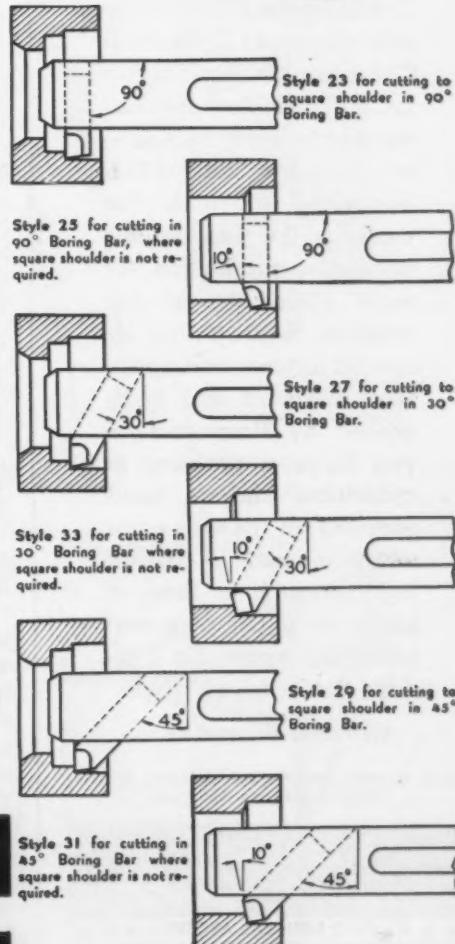
"When a single-point KENNAMETAL boring tool is used on our ordinary boring bar it holds a truer bore than two or four blade tools do. It can be run six times faster and $\frac{1}{4}$ the feed per revolution as is necessary with a two blade high speed steel cutter. This gives only half the force tending to deflect the boring bar. Furthermore, this single point KENNAMETAL boring tool can be ground off-hand, whereas a multiple-blade cutter must be ground on a cutter grinder, and costs less than one-tenth as much as the two-blade type.

"In addition, the single-point boring tool with a small nose radius reduces chatter caused by tool pressure and can be positioned more easily than the multiple blade type tool.

"The operation diagrams at the right show standard boring applications of KENNAMETAL tools which can be ordered direct from the McKenna Metals Company catalog, at a small fraction of the cost of a multiple blade cutter despite the fact that the single-pointed tool can turn out more work."

Write for your copy of the new Catalog No. 43.

*INVENTED AND MANUFACTURED IN U. S. A.



NEWS OF INDUSTRY



FOR $\frac{1}{4}$ " TO 9" OUTSIDE DIAMETERS
RODS, TUBES, BARS, VARIOUS CYLINDRICAL SHAPES

The Hammond "OD" (outside diameter) Cylindrical Finishing Machine, using for the polishing member various types of wheels—or abrasive belt with backstand to finish the work, is the best means of higher production for you. Flexibility of the machine is controlled by special fixtures and adapters, designed and engineered by Hammond. If you have a problem in cylindrical shapes, send samples of pieces on which a finish is desired together with a finished piece for a complete engineering report. Do it today, don't delay!

WRITE FOR BULLETIN GP-11

ALSO: Grinders; Abrasive Belt Surfers; Polishing Lathes and Rotary Automatics

Hammond
Machinery Builders
INC.
★ ★ ★ 1612 DOUGLAS AVENUE ★ ★ ★
KALAMAZOO • MICHIGAN
Eastern Branch - 71 West 23rd Street, New York, N.Y.

SRC Sends Inquiries
On Structural Stocks

Pittsburgh

• • • By Jan. 1, 1943, the Steel Recovery Corp. will have launched most of its programs designed to locate excess steel stocks throughout the country. Already the stainless steel quest is well toward the end and last week questionnaires were sent out to determine how much structural steels were available to those in need of this type.

More important, however, have been the insistent requests from holders of steel inventory who want to liquidate their supplies as soon as possible without waiting for the special questionnaires. It is estimated that SRC is bringing buyers and sellers together every day involving from two to three thousand tons of various grades of steel.

It is believed on good authority that since SRC started operations more than 15 million lb. of steel, mostly partly fabricated products, have been bought and used as scrap purely on requests from the holders of such material. The latter wanted to clean out stocks and voluntarily contacted SRC which promptly started the necessary proceedings.

By Dec. 15 SRC is expected to have in the hands of governmental agencies such as the Army, Navy, etc., the WPB regional directors, and certain prime contractors a partial list of the steel available based on studies made to date. As pointed out in THE IRON AGE recently, these lists will be revised from time to time to prevent unnecessary inquiries.

The stainless steel project which is almost completed involves about 4500 holders of material. Some of the larger concerns have not yet sent in their answers but it is believed that in the next few weeks enough information will be available for prospective purchasers of stainless steel stocks. About 10,000 holders of structural steel will be sent questionnaires in the current program and replies in this case are expected to be expedited in view of the experience already built up by SRC.

As a short cut to hasten the incoming data and because of the tightness of certain steel products it has been learned that SRC will, in the next few days or so, concen-



Write for Interesting Catalog

CLARK BROS BOLT CO.
MILDALE, CONN.

NEWS OF INDUSTRY

trate at least six of their recovery programs on eight to 10 thousand of the larger holders of steel stocks. Data on these were indicated in the preliminary reports which showed total types of steel held. Probably the quest for material among these large holders will include plates, hot rolled bars, alloy steels and other items, such as alloy mechanical tubing, which are tight at the present time and are greatly needed in the direct war effort.

Recent rumors to the effect that SRC will tend to buy most of the inventory stocks as scrap are unfounded. The tendency at SRC headquarters is to find buyers in every case possible for the steel "as is." Little or no thought to date has been given to the scrapping of steel which is known to be needed by consumers. Stocks that have been bought in as scrap so far represent only those cases where the holder has requested *voluntarily* that SRC take the material off their hands at the government price.

Steel consumers toying with the idea that excess steel stocks uncovered by SRC might be used in ordinary civilian endeavors seem to be "barking up the wrong tree." According to authoritative information all of this material will probably be used only for direct

NATURAL VICTORY SYMBOL: Nature formed this queer rock which bears the Allies' "V" for victory symbol. Struck by its symbolism, officials of Pratt & Whitney Div. (Niles-Bement-Pond Co.) adopted it for the company and had it mounted and placed in the office grounds as a lasting reminder of the goal that is our common cause today.



Food to the Fighters

with the help of
KEYSTONE Wire

Food is our basic weapon. Takes a lot of it every day to keep millions of men poised for attack. Takes a lot of wire, too, to help deliver that food to the mouths of fighting men.

Wire in knapsack and mess kitchen utensils, binding wire and strapping for food cartons, wire nails in food crating, ordnance equipment — these are just a few of the many thousand war uses of wire. In guns, tanks, planes, ships and bombs, too, wire plays a mighty important part.

Good reasons are these, why the Keystone mills are "drafted for the duration" . . . to turn out capacity tonnages of wire, wire products, rods and billets. Each to do its job right—to bring Victory sooner!

**KEYSTONE STEEL & WIRE CO.
PEORIA, ILLINOIS**

Special Analysis Wire
for All Industrial
Uses



FOOD CARTON
BINDING WIRE
AND STRAPPING

STEEL COT
SPRINGS

TENT ROPE
SLIPS

NEWS OF INDUSTRY

Your Choice of a Scrap Broker is Important

The sale of Iron and Steel Scrap should be—and can be—as satisfactory and pleasant as any business transaction in your plant.

Be sure to choose a broker who can rightfully claim these qualifications—

1. A reputation for trustworthiness and responsibility.
2. A record of prompt payment and readiness to adjust differences without quibbling.
3. A willingness to give extra service — such as keeping customers posted on the best prices available, finding the best market for customer's advantage and advising on the technical problems involved.

We guarantee our customers these and other high standards of business relationships.

In our career of nearly 50 years as an iron and steel scrap broker we have built on these principles.

We solicit further opportunities to be of service in the movement of iron and steel scrap from industrial plants, railroads and scrap yards to steel mills and foundries.

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Inventory Holders Told To Get Form No. 1663

Pittsburgh

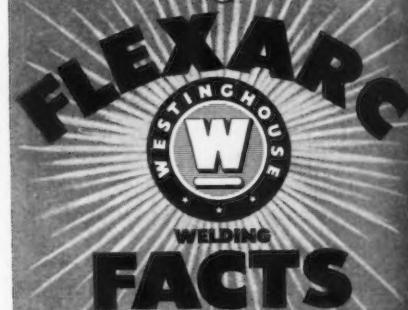
• • • Steel Recovery Corp. has urged that any holder of excess or idle inventory who has not received preliminary form No. 1663 should contact SRC immediately and such form will be sent to him.

war effort or for essential civilian needs.

As to where the SRC transactions fit into the Control Materials Plan this question is this week being decided by WPB bigwigs. It may be that the various agencies which can use material on the SRC lists will be able to get this promptly and then have this tonnage deducted from their overall requirements. Or on the other hand the material may be a "kitty" that can be drawn from in emergency conditions. At any rate, after all the forms have been returned SRC will know how much and where certain types of steel can be obtained. This in itself will serve as a hedge against any serious shortages that might hold up important armed force requirements. On the other hand it is emphasized that reports must be sent in and in the last analysis the SRC has the power to get the excess steel stocks no matter to what use they are put. At the present time this government agency is bending over backwards to see that steel "as is" is bought in that state, but if difficulties are encountered the SRC has the power to take what it wants and do what it wants with the material.

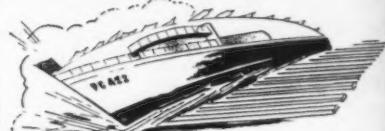
Thoughts entertained by some sources that present stocks of excess steel might be used for purely civilian uses are at the present, at least, "wishful thinking" since action at SRC and WPB is slated to emphasize only direct war needs and essential defense requirements. What might happen next year if steel supplies become more plentiful remains to be seen. At least steel bars, plates and alloy steels will find their way into direct war needs in view of the present shortage.

Westinghouse



TIMESAVER ON SUBCHASERS

(Reading Time . . . 45 Seconds)



How are you solving your manpower shortage? A basic step is to simplify the machines your workers must handle. For example, here's how a Midwestern shipbuilding company saves manhours for building more PC boats.

It's just plain common sense that machinery with moving parts requires more maintenance checks than a machine without moving parts. So this boat builder bought only "maintenance free" Westinghouse A.C. Welders for his metal joining work.



As a result, his welding machine maintenance crew was reduced to a bare few. And his old operators and "green" men are producing better welds, faster—just because Westinghouse A.C. Arc Welders are so dog-gone simple to operate.



Welds are even easy in a PC boat's "hard-to-weld" joints because A.C. welding eliminates magnetic arc blow. Even at high current, the A.C. arc bites into corners—produces uniformly sound welds . . . fast.



A.C. welding offers many advantages that are especially valuable today. Get complete facts. Ask your Westinghouse representative or write for catalog B-3136.

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Per Edge of Blade**

A

**AMERICAN
SHEAR KNIFE CO.**
HOMESTEAD, PENNSYLVANIA

NEWS OF INDUSTRY

Gillette Heads WPB Farm Tool Division

Washington

• • • George L. Gillette, Minneapolis, has been appointed director of the WPB Farm Machinery and Equipment Division. He comes to WPB from the Minneapolis-Moline Power Implement Co., where he was vice-president and general sales manager. Mr. Gillette succeeds William R. Tracy, who recently resigned to accept a position in the Motor Transport Division, War Department.

Graduated from the University of Minnesota with a degree in Civil Engineering in 1905, Mr. Gillette began his business career as a time-keeper for the Minneapolis Steel & Machinery Co. and continued with this parent organization through various mergers until in 1929 it became part of the Minneapolis-Moline Power Implement Co. He is on the Executive Board of the Farm Equipment Institute.

At the same time, announcement was made of the appointment of George Krieger as deputy director of the Farm Machinery and Equipment Division. He comes from Detroit, where he was manager of the Agricultural Engineering Division of the Ethyl Corp.

Born in Portsmouth, Va., and a graduate of the Virginia Polytechnic Institute, since 1926 Mr. Krieger has devoted himself to experimental work, designed to make more efficient application of power to farm equipment. Mr. Krieger lives in Birmingham, a suburb of Detroit.

Boeing Aircraft Will Expand Kansas Facilities

Washington

• • • Defense Plant Corp., RFC subsidiary, has authorized a contract with Boeing Aircraft Co., Seattle, for additional plant facilities in Kansas at a cost in excess of \$2,300,000, making a total commitment in excess of \$25,000,000.

COMING EVENTS

Nov. 30 to Dec. 4—National Exposition of Power and Mechanical Engineering, New York.

* Nov. 30 to Dec. 4—American Society of Mechanical Engineers, New York.

April 7 to 10, 1943—Electrochemical Society, Pittsburgh.

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OF KALAMAZOO

AUTOMATIC FINISHING MACHINES



For Burring, Brushing and Polishing of

PLATED OR BASE METALS

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WRITE FOR BULLETIN GP-17

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3520 De Kalb Street, St. Louis, Missouri

Quick Answers to Questions on CMP

• • • Here are some of the questions and answers pertaining to the new Controlled Materials Plan, which came up at the session in New York, Nov. 24, at Hotel Pennsylvania. These are unofficial, as caught by THE IRON AGE reporter. If the answers aren't clear or seem to clash with interpretations by other authorities, take the matter up with WPB. Doubtless the official version of these questions and answers will contain changes after the text is examined by Washington authorities.

Q.—How does a producer of Class B, Group 1, products get allotments?

A.—He applies to the industry division.

Q.—Does PRP continue in effect after July 1, 1943, on non-controlled materials?

A.—No, not as we know it now. But certain phases of PRP will be fitted into CMP.

Q.—My product is not Class A and is not listed under Class B. Where do I fit into PRP?

A.—You probably are a raw materials producer. Continue to operate under the same priority and allocation procedures as at present.

Q.—My firm makes around half a million dollars' worth per quarter but will not have orders for next April until late January. How do I operate under CMP to get material?

A.—If you make an "A" product, buyers will probably supply allotments when you receive their order. If you make a "B" product, you are allowed to estimate future business.

Q.—Is iron a controlled material?
A.—No.

Q.—What will be the effect of preference ratings at the mill level?

A.—Preference ratings will have no effect at the mill level. The allotment number prevails.

Q.—Will CMP mean that the government will have to order farther in the future?

A.—Not necessarily. War won't permit buying everything 18 months in advance.

Q.—Will Army and Navy specifications be frozen, in view of CMP?

A.—If changes become necessary during quarters, allotments will change.

Q.—How does a manufacturer using 15,000 items, with 50 major and 10 prime contracts, fit into this program?

INDUSTRY

Q.—If the procedure for obtaining materials under the "A" setup doesn't work out for such a firm, his application from "A" procedure to "B" procedure will be considered.

Q.—As a supplier of Class B products, I receive my orders directly from the Army and Navy. Do I receive my allotments direct from the Army and Navy bureaus?

A.—No. If you make Class B products you get the material from the industry divisions.

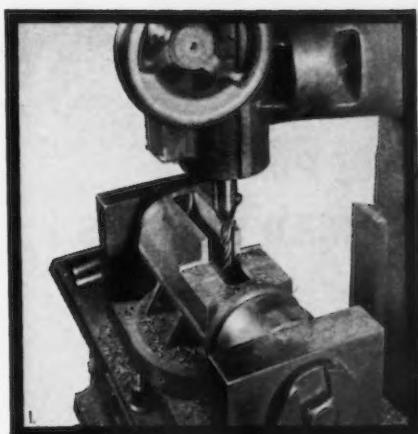
Q.—How can we order in advance?

A.—Agencies are allowed to make advance allotments for a percentage of their probable totals.

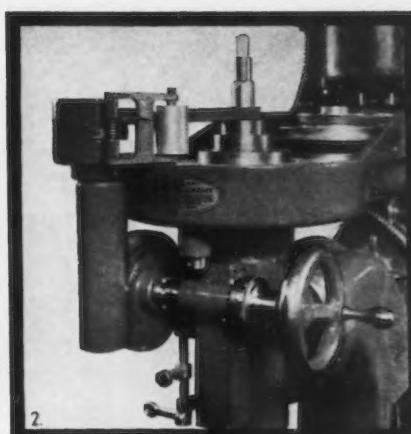
Q.—Explain more fully how deliveries will be handled under CMP?

A.—Controlled materials are to be delivered as authorized, by months. Orders for the long term may be placed, but are no good until an allotment number has been applied. Controlled material suppliers may ship from the 15th of the month preceding the month specified, to the last day of the month succeeding the

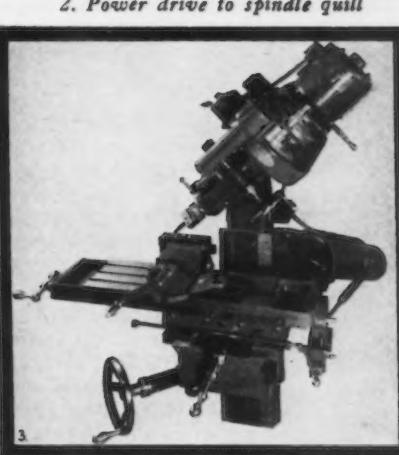
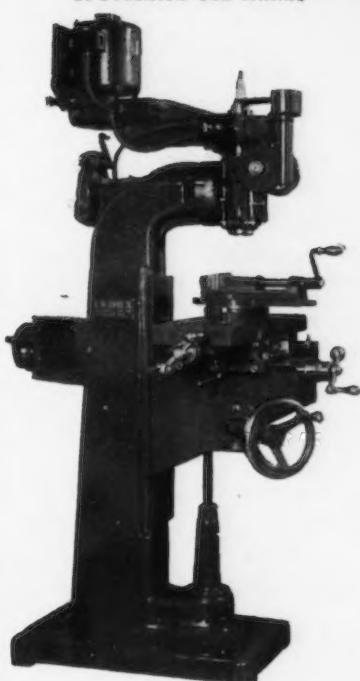
RIVET EXPLORERS: These electric guns, shown reaching the finishing stage of assembly, used to touch off the charge in the du Pont explosive rivet. These rivets, described in the July 17, 1941, issue of THE IRON AGE, are used in the difficult riveting positions in aircraft assembly. By applying heat from a gun such as this, the rivet explodes thus capping itself and making a tight joint where the usual riveting procedure is not possible. The new heat gun is a product of Westinghouse.



1. Precision end-milling



2. Power drive to spindle quill



3. Head swivels 90° each way

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40-H INDEX

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Your screw requirements can be met without delay—with genuine fast-starting, quick-driving, tight-seating Phillips Recessed Head Screws.

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COST LESS TO USE!"

WHAT ABOUT DRIVERS? There are 44 sources of supply for PHILLIPS DRIVERS plus hardware and mill supply distribution.



PHILLIPS RECESSED HEAD SCREWS

GIVE YOU *2 for 1*

(SPEED AT LOWER COST)

WOOD SCREWS • MACHINE SCREWS • SHEET METAL SCREWS • STOVE BOLTS
SPECIAL THREAD-CUTTING SCREWS • SCREWS WITH LOCK WASHERS

month specified, or during a 75-day period.

Q.—Do we have to furnish Bills of Material for everything?

A.—No. The initiative is with the agencies. When you are asked for a bill of material, then you must supply it.

Q.—What does a precedence list mean under CMP?

A.—It has no meaning.

Q.—How does a Class B producer buy steel to make hardware for military uses, ordered on short notice?

A.—Hardware is a class B item. You will be given enough material to maintain ordinary output.

Q.—What will happen to the carry-over of material from present allotments after April 1?

A.—This depends on how far down the line you are. If a prime consumer, you will hear from your agency. If you are real far down the line you may not hear until after the second quarter of 1943 begins. If necessary, PD-25-a authorizations for first quarter may be extended into second quarter. CMP orders will get preference over PRP orders in second quarter, however.

Q.—Is physical separation of allotments necessary?

A.—No.

Q.—On developmental contracts, where time factors are impossible to estimate, how can we comply fully with CMP procedure?

A.—The plan as drafted doesn't cover the point.

Q.—How can tool steel be bought by a plant which is a large primary and secondary producer?

A.—If for an A product, the prime consumer will handle the allotment.

Q.—What are the provisions under CMP for repairs to customer's apparatus?

A.—Regulations have not been completed yet covering maintenance, repair and operating supplies.

Q.—Under the 75-day delivery period, will not mills fail to refuse to decline orders in excess of capacity?

A.—Mills' orders will be based on a 30-day period only.

Q.—Will the machine tool industry be affected by CMP?

A.—Machine tools are listed under Class B. This means the machine tool producer will operate as a Class B producer.

Q.—I ship 95 per cent of my goods to the Navy and 5 per cent to the public. How do I get material under CMP?

A.—If you are making the same product for both classes of consumers, it is almost certain to be a Class B product and you follow the rules for Class B. If part are Class A and part are Class B you operate, in effect, as though you were two different manufacturers, getting Class A un-

der the Class A procedure and Class B under Class B procedure.

Q.—Isn't the initiative of producers overlooked under CMP?

A.—Initiative and capacity of prime consumers can't go beyond the materials available.

Q.—Will steel warehouses need allotment numbers to get steel from mills?

A.—No. Mills will be directed to supply warehouses.

Q.—Are allotments issued for operating supplies which contain controlled materials?

A.—In general, no.

Q.—To whom does a construction contractor apply for steel when awarded a lump sum job for essential civilian use?

A.—To the governmental agency constructing the building, or to the proper branch of WPB.

Q.—Are lighting fixtures on the "B" list?

A.—Yes. They appear under lamps and bulbs.

Q.—Who will check the accuracy of bills of materials?

A.—Responsibility will start with the WPB with respect to the claimant agencies and will continue on down.

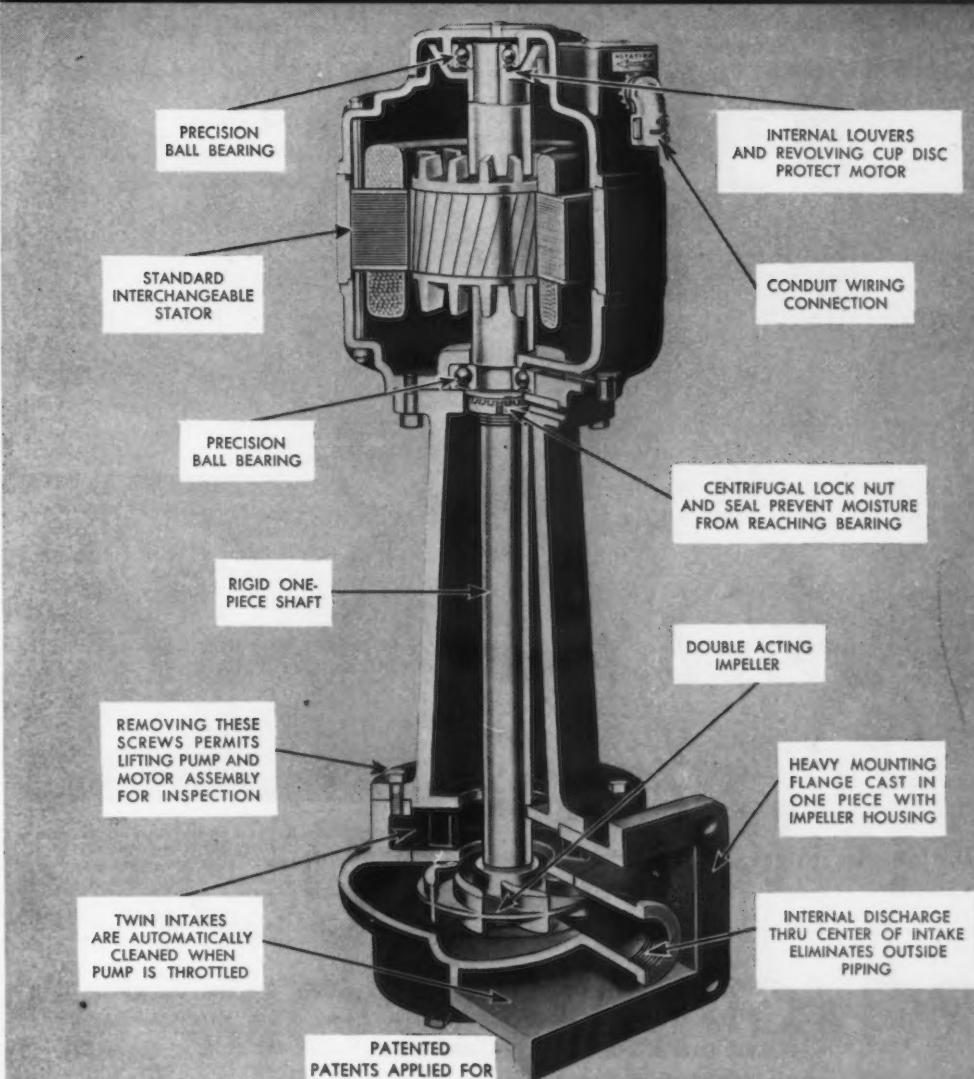
TIME-SAVER: Nash-Kelvinator has developed this gage checking truck as a way of eliminating the time formerly lost while workers took gages to a central point, at regular intervals, for checking against a master gage. Five such trucks bearing full master checking equipment now roll through the plants continuously on a 24 hr. basis. A time saving of an hour per man per turn is reported.



RUTHMAN

Gusher Coolant Pumps

THE OUTSTANDING COOLANT PUMP TODAY—



IT'S the amount of work a cutting tool will do between grinds that counts. Care in tool-grinding, proper rake angles, valuable tool steels, etc., should not be sacrificed for lack of a constant supply of coolant at the cutting points. Ruthman Coolant Pumps are so dependable and efficient—both while new and for years after—that thousands of manufacturers now prefer Ruthman. Look over the construction of Ruthman Coolant Pumps, and you'll see why they are so popular in shops that want to be free of coolant pump maintenance trouble.



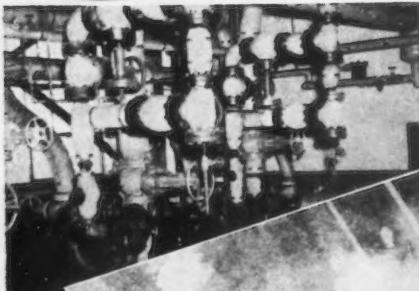
Modern machinery and expert workmen achieve preproduction of Gusher Coolant Pumps.



All parts are accurately finished and inspected. Only highest grade motors with precision bearings are used.

Carey PRODUCTS

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VICTORY**

GUNS, PLANES, TANKS, SHIPS—these are the machines of war that reach the fighting front. Yet they are but a small part of America mobilized for war.

Back of these fighting forces are the nation's stupendous industrial resources—the thousands of plants that fabricate the materials for industrial construction and provide housing for our millions of war workers—that produce the Steel, Aluminum, Power, 100-Octane Gasoline, and countless other products vital to the war effort. In this group is CAREY—a large part of its production now going into construction related to the job of winning the war.

CAREY PRODUCTS are saving thousands of tons of steel . . . Conserving Fuel, Power and Transportation . . . Aiding production of Aviation Gasoline and Synthetic Rubber . . . Contributing to the efficiency of man-power and machine-power . . . Supplying essential materials for industrial construction and war housing.

On these and a hundred other fronts, CAREY Products are performing services that are war essentials, such as the invaluable services of Carey Rock Wool Insulation in conserving fuel in the homes and business buildings of the nation; while many other Carey Products are meeting city and farm civilian needs for repairs and maintenance—vital factors also in America's Mobilization for Victory.

THE PHILIP CAREY MFG. CO. ★ ★

Dependable Products Since 1873 • Lockland, Cincinnati, Ohio

IN CANADA: THE PHILIP CAREY COMPANY, LTD., Office and Factory: LENNOXVILLE, P.Q.

Asks Manufacturers to Report Idle Spray-Type Metal Washers

• • • The cooperation of industry in reporting the many spray washers which are probably standing idle in plants scattered over the country has been called for by C. A. Campbell, president of Solventol Chemical Products, Inc., Detroit. High priorities for sheet steel, motors, pumps, conveyors, and so forth, are being granted the industry and fairly prompt deliveries are being secured, but industry could cut down requirements for these critical new materials if old metal washers could be turned in. At least their pumps, motors and conveyors could be put into active service. Also, it would help to know where two and three-stage washers are being used on a one-stage basis only. In many such cases the unused stages could be made into separate units for use in other plants.

J. R. Ewing of Solventol has been designated by his company to receive reports of available washer equipment and to distribute them in bulletin form each week to all other manufacturers of spray washing machines. These bulletins will be available to all war plants requiring additional equipment.

"Our effort in this matter is without official government direction," Mr. Campbell said, "but we believe that the greatest American edge over the Axis is the patriotic, voluntary help of millions of our citizens. We are willing to assume the burden of tabulating and distributing the information, even though it does mean some loss in terms of new washers."

Foundrymen to Hold Annual Meeting At St. Louis

Chicago

• • • The 47th annual meeting of the American Foundrymen Association will be held in St. Louis, April 28, 29, and 30, 1943, the association has announced. The meeting will be staged without commercial exhibits.

The theme of the 1943 meeting will be "Mobilization of Management, Technical and Operating Men" for the purpose of devising ways of extending the use of cast metals in the war effort.

Hotels Jefferson and Statler in St. Louis have been designed as joint headquarters.

WLB Reports Less Strikes, Man Days Lost

• • • The WLB reports that strikes in progress during the month of October fell to 115 from 187 the previous month. Likewise man days lost through strikes fell from 318,892 in September to 167,865 in October. In percentage this reflects a change of from 1/10 of one per cent to a low since January of 1/20 of one per cent of the man days worked. At the same time the total number of man days worked rose from 332,000,000 to 350,000,000 and the number of men involved in strikes fell from 80,799 to 42,320.

New Welding Handbook Greatly Enlarged

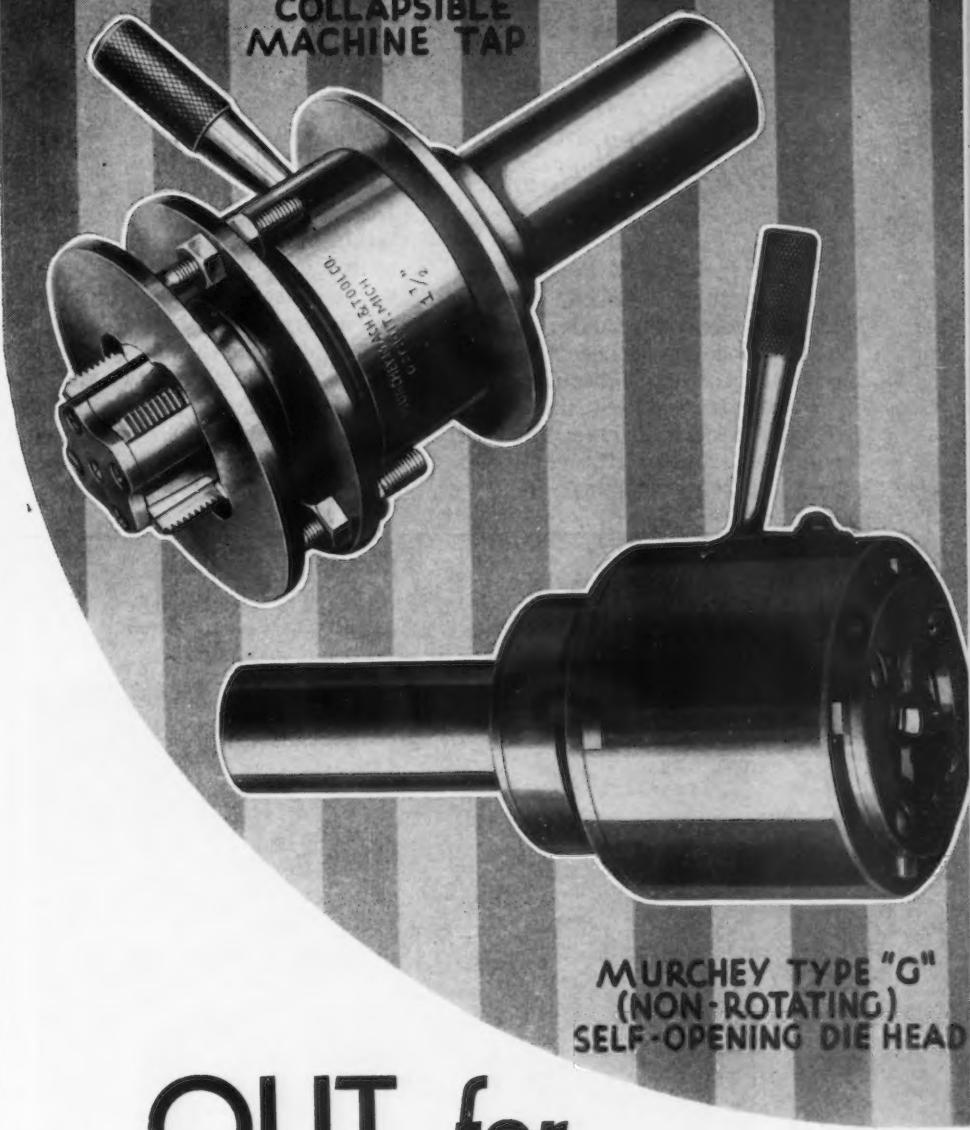
• • • The 1942 edition of the Welding Handbook is now available from the American Welding Society. Representing the first revision since the 1938 edition, it contains approximately 1600 pages or roughly 400 more than the first edition. Much of the material has been rearranged and a number of new sections added.

Fundamentals of welding, including physics of welding, metallurgy and weldability of steel start off the book. Much of this is new material. Among the welding processes there is a new chapter on submerged melt welding (Unionmelt) and there are new chapters on welding electrode coatings and resistance welding electrodes. The new tentative specifications for iron and steel arc welding electrodes and gas welding rods are included, as is the tentative specification on aluminum alloy arc welding electrodes. New data is included on the welding of clad steels and on welding lead and zinc products.

The section on training, inspection and safety has been amplified and much design material has been added to the section on testing of welds. The section on welding applications has been rearranged and the examples brought up to date.

Copies of the Welding Handbook may be obtained from the American Welding Society, 33 W. 39th Street, New York, at \$6.00 for non-members.

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COLLAPSIBLE
MACHINE TAP**



OUT for MORE THREADS

The Collapsible Tap illustrated is a new design of universal type. With the handle you can use it as a stationary tap on turret lathes and hand screw machines. Without the handle it becomes a rotating tap for drill presses or tapping machines.

The non-rotating Self-Opening Die Head uses the same chasers as do the rotating types so that you can produce more threads with a nominal investment in tool equipment.

From every production viewpoint Murchey Threading Tools are out for more threads.

MURCHEY
MACHINE & TOOL CO.
Detroit, Michigan

**1000 Steel Men,
WPB Aides Hear
Lecture on CMP**

Washington

• • • Courtney Johnson, Chief of the WPB Controlled Materials Plan Information and Service Unit, last Friday lectured to more than 1000 American Iron and Steel Institute officials, executives of leading steel companies and WPB employees. The lecture was illustrated by

slides which showed a simplified version of the plan.

Among the highlights of Mr. Johnson's talk were discussions pertaining to preference ratings, allotment numbers, and the means by which unscheduled manufacturers are secured in material supply. It was made clear that preference ratings do not apply at the mill level nor do allotment numbers govern rolling schedules. Preference ratings apply solely to non-controlled materials and fabricated parts of

controlled materials. The difficulty which mills would have encountered if they were forced to stick to rigid order in rolling has been overcome by permitting the mills and their consumers to iron out delivery dates among themselves.

It was explained at the meeting that allotment numbers would be valid for 75 days. WPB realized that consumers would not like uncertainty in time of delivery but at the same time would not like it if the life of allotment numbers was ended in 30 days. It was decided that the 75-day time lag would be most satisfactory to all parties to enable mills to make late deliveries in cases where production emergencies arose. Mr. Johnson pointed out that this should cause no concern on the part of prime contractors since under CMP mills are required to deliver current months orders before they can begin on the succeeding months orders. Deliveries on allotment numbers more than one month old, he said, would be at the direction of the Controlled Material Division.

The AAA preference ratings take precedence even over allotment numbers, but not at the mill level, it was said. This rating, it is understood, is reserved for emergencies, for example, steel for a disabled ship. The AAA rating would be issued by the claimant agency to a supplier who would inform the mill of his needs. The mill would tell the Steel Division and the Steel Division would direct the mill's rolling schedule on this steel.

A simplified version of PRP will be employed by WPB to enable manufacturers to secure unscheduled "on-the-shelf" Class B products. A new Form PD-25a will be provided which manufacturers may fill out in applying for their unscheduled Class B requirements to the WPB Industry Divisions.

The problem of getting material out based on bills of material received without application by prime contractors was mentioned. The procedure of authorizing the use of various materials on the basis of bills of material received was condemned by Mr. Johnson. The reasons he said this would not work are that specifications might change; switches from male to female labor might cause the generation of more scrap and rejects, the installation of new and possibly more efficient machine tool equipment could use more material.

STRONG • CONTROL

STRONG



CHECK AND DOUBLE CHECK!

Strong steel for Strong castings is Strong-made from the highest quality scrap and pig iron obtainable—and it is always under the vigilant acceptance or rejection of the chemical laboratory.

Every moment of the melting is under the control of competent experts, long versed in the making of casting steel. Each heat is subjected to rigid chemical and temperature checks during the refining process and a running record is kept of the chemical and physical properties of every melt. Know the Strong way for your castings—write or wire now.

STRONG STEEL FOUNDRY COMPANY, BUFFALO, N. Y.

S T R O N G


NEWS OF INDUSTRY

Drop Shown in October Fabricated Shipments

• • • Shipments of fabricated structural steel in October were 146,648 tons compared with 217,738 tons in October 1941 according to the American Institute of Steel Construction. For the first ten months of the year, shipments amounted to 1,758,001 tons against 1,892,370 tons in the similar period of 1941. The backlog for future fabrication was reported to be 617,676 tons to Nov. 1 compared with 614,374 tons to the same date last year.

USES Job Placements in Pennsylvania Near 300,000

Harrisburg, Pa.

• • • Job openings filled by the U. S. Employment Service in Pennsylvania this year neared the 300,000 mark as approximately 12,450 additional job placements were made in the first two weeks in November, according to H. Raymond Mason, USES Director for Pennsylvania.

"The activity of the Employment Service in meeting the labor needs of war industry is reflected in these placement totals," Mason said. "This high placement rate must be maintained and even increased through the greater use of women workers, handicapped and minority groups, and the steady transfer of workers from non-essential industry to war production."

Weekly figures in Mason's report indicated that placements by the agency dipped sharply in the week ending November 6, when the 5215 persons placed in jobs represented a 25 per cent decrease from the preceding week. Diminishing activity in a number of large construction projects throughout the state was partly responsible for the decline. In the week ending November 13, job placements rose slightly to number 5227.

Metal Toys Again Limited

Washington

• • • Santa Claus will be short on metal toys this Christmas. The sad news has been given the nation's youngsters by WPB which has urged them to conserve their fire engines, automobiles, trucks, stoves, houses, soldiers and an

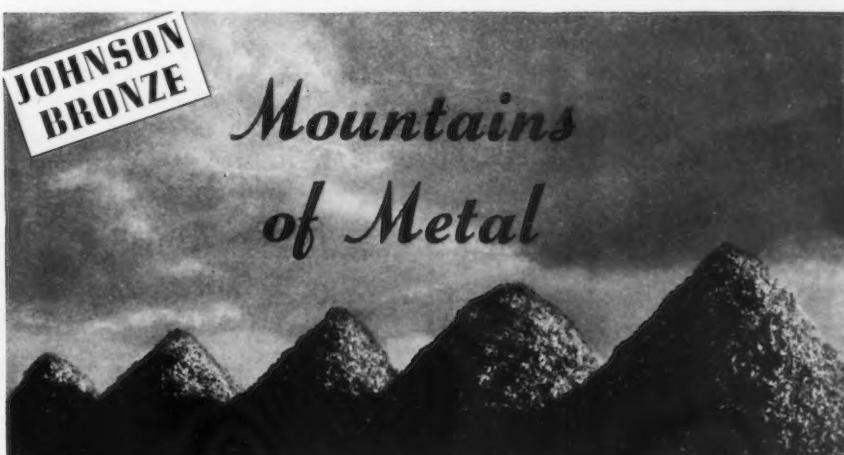
endless number of other playthings made of steel and other critical metals.

Effective immediately, WPB on Wednesday of last week stopped production of toys, games or repair or replacement parts for toys or games containing certain critical materials except joining hardware made out of iron or steel. The action taken through an amendment to L-81, also placed a limitation on the amount of join-

ing hardware which may be used, restricting the rate of consumption to the amount used in 1941.

Restrictions previously placed on the use of rayon in toys and games were lifted by the amendment.

Toys and games using certain critical materials were originally banned last March 30, and further restrictions upon the use of certain other critical materials went into effect June 30.



that could help WIN the WAR

Every time you purchase Bearing Bronze in the "rough," you buy at least 25% more metal than necessary. Quality bearing bronze contains copper, tin and lead . . . metals that are vital to our war effort. When your purchases amount to tons, you actually remove mountains of metal from the active market.

You can easily avoid this waste . . . get a higher quality product . . . save many hours of machine time by specifying Johnson UNIVERSAL Bronze. Every Johnson bar is completely machined—I. D.—O. D.—ENDS. Our range of over 350 stock sizes enables you to buy according to your needs. Why not start today to help conserve metal? Your local Johnson Distributor can give you excellent service. His name will be found in your telephone book.



WRITE FOR STOCK LIST

JOHNSON BRONZE

Sleeve BEARING HEADQUARTERS

505 S. MILL STREET • NEW CASTLE, PA.

Canada's '42 War Output \$2.5 Billions

Toronto

• • • Canada's war production this year will have a value of \$2,500,000,000, C. D. Howe, Minister of Munitions and Supply, stated in a review of the country's war program. Substantial increase over the above total is planned for 1943, and production of mechanized equipment alone for next year is expected

to reach a total value of \$1,000,000,000, Mr. Howe said. Canada is making eight types of artillery guns and field guns; 14 types of small arms, aircraft guns and rifles, and in every minute, 40,000 finished rounds of ammunitions are being produced in Canadian plants.

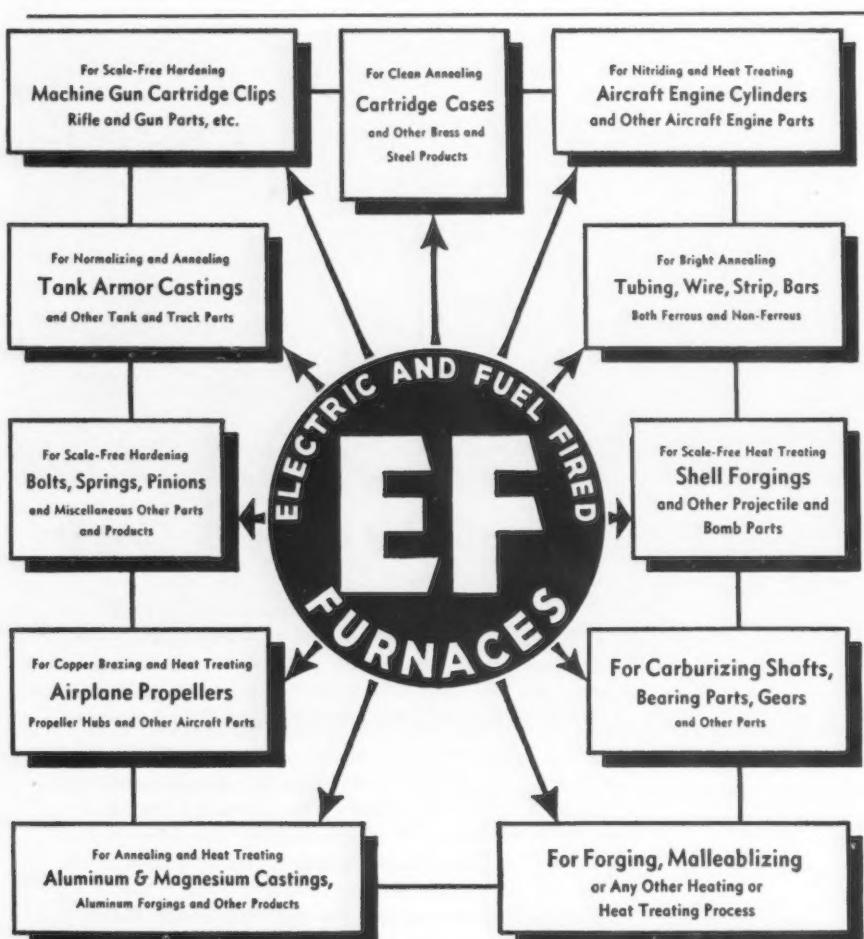
Dealing with the growth of Canadian industry, Mr. Howe said that plants here are supplying several thousands of planes for the British Commonwealth Air Training Plan, for coastal work and for

overseas service. Canada now is going into production of bigger planes, and plans are underway for production of three Mosquito planes a day and "we hope to be in substantial production of Lancaster bombers next spring," he stated. The Hell Diver, the latest dive bomber, also will be in production early in the New Year.

In addition to corvettes, mine sweepers and other naval craft, Mr. Howe stated, "we hope to deliver a finished destroyer soon of 100 per cent Canadian manufacture." To date 87 of the 10,000 ton merchant ships have been constructed in Canadian shipyards in addition to several of 5000 tons deadweight, which brings the Dominion's output of merchant ships to about the same level as Great Britain's, he stated. The cost of ship construction has been decreasing steadily and before long Canada will be building ships cheaper than any other country, Mr. Howe stated.

Production of motorized vehicles has increased ten times since the outbreak of war. Regarding tanks, Mr. Howe stated that the Valentine tank production is three a day, and Canadian plants have delivered more than 1000 Ram tanks.

Other accomplishments in Canada's war program, Mr. Howe stated, is the establishment of an optical glass industry in Ontario which now is producing telescopes, periscopes, gun-sights, bomb-sights and secret radio equipment. More than \$40,000,000 is being spent to produce artificial rubber on a plant at Sarnia. Expansion of aluminum production, a new process for making magnesium, increase in base metal production and discovery of chrome and tungsten deposits are all helping Canada's war effort, Mr. Howe said.



Increased production and uniformity; the saving of valuable time, labor and metals and other advantages have been effected by recent EF continuous automatic, semi-continuous and batch type furnace installations.

The Electric Furnace Co. specializes in designing and building production furnaces and time and labor saving material handling equipment. Years of practical furnace building experience have enabled EF engineers to develop some outstanding production furnaces for handling the above materials and many other essential war products.

Submit YOUR production furnace problems to EF engineers.
Phone 4661, Salem, Ohio.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces—For Any Process, Product or Production

Fuel Oil Adjustment

• • • OPA has set a uniform ceiling price of \$1.10 per barrel for Bunker C and No. 6 fuel oils at Mobile, Ala. The action is contained in Amendment 46 to Schedule 88, effective Nov. 25.

In Amendment 47 to the order, effective Nov. 25, the ceiling for residual diesel, 26 A.P.I. gravity and below, ships' bunkers, will be \$1.35 a barrel, while the maximum for distillate diesel, 28 A.P.I. gravity and above, will be \$1.65, ships' bunkers, on the Texas Louisiana coast.

NEWS OF INDUSTRY

Dominion Relies on U. S. for 40% of Steel

Toronto

• • • While production of both iron and steel in Canada has been holding close to the capacity mark for upwards of a month, output is only sufficient to provide about 60 per cent of the country's war needs and leaving only a small tonnage for essential peace-time production. Canada is depending on the United States for about 40 per cent of her steel requirements under existing war production schedules, but as these are sharply expanded as planned for early next year, much greater assistance may be necessary from our neighbor. The Canadian government is extending its efforts to curb nonessential use of steel and labor. Already a number of strictly peace-time industries have been forced out of business, and latest Ottawa information indicates that more drastic action in this connection is under consideration.

New regulations have been issued by the Steel Controller which limits inventories of steel stocks by warehouses to 30 days and for manufacturing concerns to 90 days. This action was taken to keep steel moving to all war industries and curb hoarding. It also is understood that the Steel Controller is considering certain changes with regard to steel shipments. As the result of the large and growing imports of steel from the United States, Canada's present allocation system appears to be becoming obsolete and a change over to the United States' system may soon be embarked upon.

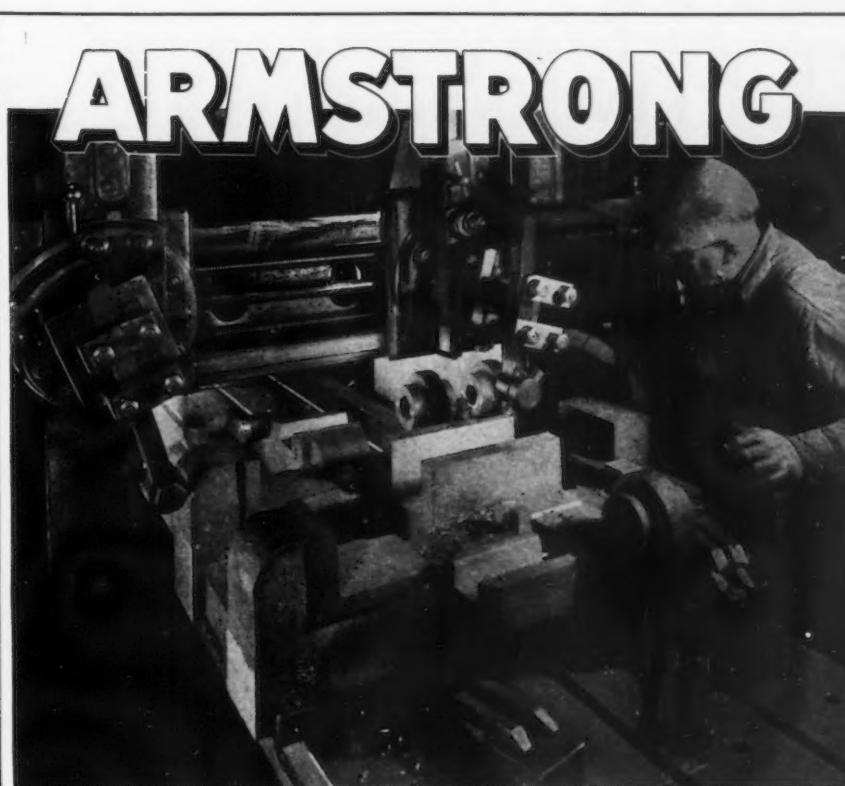
One of the chief problems is providing plate for the expanding shipbuilding program. Canada's shipbuilding program calls for construction of 300 merchant ships of 10,000 tons deadweight and 18 ships of 5000 tons deadweight, as well as numerous corvettes, minesweepers and other naval craft, including destroyers. To date 87 of the larger merchant ships have been delivered and several of the 5000 ton boats. Canadian plate mills are maintaining production well in excess of rated capacity, one Ontario mill having made records on a number of occasions of 75 per cent above rated capacity. While most of the plate is going to shipbuilding account, as well as the greater part of imported plate,

some tonnages are being earmarked for other essential purposes. Rolling stock builders are receiving regular monthly shipments, but not sufficient to enable them to maintain schedule output of new cars; a contract has been closed for 2000 tons of plate for the new government plant at Sarnia, Ont., and some small shipments are being made for the nonferrous mines of Northern Ontario.

Canada's Price Board Given Vast Powers

Toronto

• • • Canadian Government has issued a new order-in-council which strengthens and extends the powers of the Wartime Prices and Trade Board. Under the new order the board acquires almost dictatorial powers over all industry in Canada. The board now may pro-



ARMSTRONG

ARMSTRONG PLANER TOOLS

Speed up any planing job!

With an ARMSTRONG Planer Tool for each planer head, you can start any planer job without waiting to "tool-up," for "tooling-up" is reduced to selection of cutters, adjustment of cutter angle and clearance and tightening the set nut. These permanent, all-purpose tool holders take cutters quickly ground from standard high speed steel "squares" or "flats". They hold cutters at any angle . . . right or left . . . and at any clearance, always permitting the most efficient approach to the cut. They hold cutters ahead of center for extreme rigidity, or behind center when "gooseneck" tool is wanted, as for keyways or for heavy cuts on especially tough steel. Because of the extreme adjustability of these tools, it is often possible to complete jobs requiring top and side planing, under-cutting, and sectional interrupted cuts without moving work on the bed of the planer. It is the most efficient planer tool obtainable for all planer operations, except where extremely large areas are to be surfaced. For large surfaces, the ARMSTRONG Gang Planer Tool is recommended, for it will cut planing time as much as 60%.

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Eastern Warehouse & Sales: 199 Lafayette St., New York, N. Y.



ARMSTRONG TOOL HOLDERS Are Used in Over 95% of the Machine Shops and Tool Rooms

hibit the "formation, commencement, operation, amalgamation, merger, consolidation or transfer" of any business or undertaking. It may prescribe the conditions under which they may or may not be formed, operated, merged or transferred. A person engaged in business may be required to discontinue or limit that business in whole or in part. Those engaged in any business or undertaking may be required to pool or otherwise use, any real and personal

property in such manner and on such terms as the Board may order.

Suggestions from the operators of two or more businesses for the pooling or other disposition of the revenues or profits of their businesses, or the establishment of a fund or funds for compensation for those required to discontinue or limit a business or undertaking in line with Board regulations, may be approved by the Board. Apart from such voluntary suggestions

being accepted, the Board may require establishment of funds to compensate persons required to discontinue or limit their business or undertaking. It may require any person to contribute to such funds on terms to be prescribed. Distribution of these funds will be made as the Board sees fit, although the regulations are not deemed to require the Board to provide compensation for anyone.

By specific regulation, Finance Minister Ilsley must be kept informed of the principles the board is following in exercising the powers granted to it. It must refrain from doing such things as the Minister in writing may direct.

The amended regulations declare the board's control over the terms and conditions of all manufacture, sale, installation, delivery and use of goods and services may be prescribed by the Board. Any person may be required to obtain a license or permit from the board. In cases where the board decides to take possession of goods or services, the price or compensation—will be prescribed by the Board with the approval of the Finance Minister.

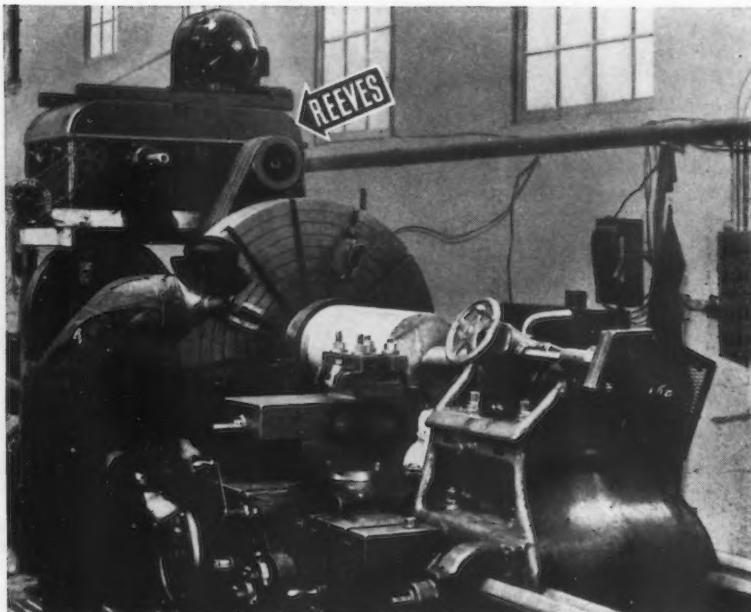
Joshua Hendy Iron Works To Buy Crocker-Wheeler Co.

• • • Joshua Hendy Iron Works, Sunnyvale, Cal., has arranged for purchase of the Crocker-Wheeler Electrical Mfg. Co. with its large manufacturing plant in Ampere, N. J., and district offices in the principal cities of the United States. The sale will become final if ratified by Crocker-Wheeler shareholders at a meeting Dec. 10.

In addition to articles of war manufactured by Crocker-Wheeler, its standard products include polyphase induction motors, synchronous motors, direct current motors, alternating current generators, direct current generators and motor generator sets.

Charles E. Moore, president of Joshua Hendy Iron Works, stated that the proposed purchase would not change Crocker-Wheeler's production of electric motors and other products, and that the management and employees of the New Jersey concern's plants would remain intact. Executive control, however, would be centered at Joshua Hendy's general offices in Sunnyvale.

NEW ENGINES FOR *Liberty Ships*



...built from "scratch" in 90 days with old machines and REEVES Speed Control

A group of industrialists in a Western city wanted to help meet the government's call for more ships. They had a plant—they had the experience—they had the backing. They were offered an order for triple-expansion main propulsion engines for Liberty Ships. But, they didn't have enough tools—and new tools were not to be had. There was no time and little material for building new tools. So they took old, obsolete machines—the only kind they could get—equipped many of them with REEVES Variable Speed Drives for complete speed adjustability and went to work.... Within 90 days the first engine was delivered. Today a steady stream of engines is being turned out. This record is certainly a tribute to American ingenuity and resourcefulness, and REEVES is proud to have had a part in it.... Booklet IG-423, "More Output for Victory Through Variable Speeds," gives other examples of how REEVES units are helping speed up war production. Write for it.

REEVES PULLEY COMPANY, COLUMBUS, INDIANA

Reeves Speed Control

NEWS OF INDUSTRY

CIO Starts Drive on Armco and Weirton

• • • A vigorous organizing drive by the United Steel Workers of America (CIO) against the last two outposts of unorganized labor in the steel industry is being opened up against the American Rolling Mill Co. and the Weirton Steel Co., according to the CIO publication *Steel Labor*.

John V. Riffe, international representative of the union, has been named to head the campaign assisted by a large staff of USA representatives. Directing offices have been opened in Middletown and Zanesville, Ohio; Ashland, Ky.; Butler, Pa.; Baltimore; and Weirton, W. Va.

"We are determined to stay here and assist the workers of Armco and Weirton in winning genuine collective bargaining contracts with their employers," stated Mr. Riffe.

The drive to organize Armco closely followed a decision of the NLRB disassociating the Armco intra-company (independent) unions, and compelling the company to cease and desist from interfering with the right of employees to join the USA-CIO and from dominating the Ashland Armco Plan of Employee Representation or any other company union. The NLRB order was based on charges filed by the USA-CIO in May, 1937, and on extended hearings conducted by the board since that time.

Regional MRB Notes Increasing Efficiency

Philadelphia

• • • The local Materials Redistribution Branch of WPB is proving increasing efficiency in recent operations which have saved numerous war plants from production slowdowns or stoppage by locating and moving materials before the critical moment arrives. This was disclosed this week by means of a number of recent typical operations made public for the first time.

Complete files of excess and idle stocks of critical materials from every part of the country are recorded in the files of the various MRB offices. In this way, the en-

tire country can be blanketed if necessary to locate a particular material.

Typical of this operation is the case of a Philadelphia forge company needing a supply of a secret formula metal for use in non-lubricated bearings. The local MRB finally located 20,000 lb. of the needed metal in Chicago and within 6 hr. had arranged for its disposal and shipment to the forge company.

Eastern Aircraft Corp., Phila.,

encountered a shortage of a certain alloy steel which promised to stop production. MRB found the necessary amount and arranged for delivery to the plant within two days.

Several hundred instances of this kind could be recorded from this regional office alone and could be multiplied hundreds of times throughout the nation. Records to date point to MRB as one of the most successful war babies of the WPB.

CLEANING ALUMINUM AND ALUMINUM ALLOYS

• Wyandotte Research has developed two degreasing and cleaning compounds for this sensitive metal, neither of which will attack or etch the metal in any manner.

• Wyandotte Light Alloy No. 1 — A powder (low in silicate) for cleaning prior to anodizing. Rapid in cleaning action. Triple A in rinsability — equally applicable to castings, sheets, etc.

• Wyandotte MK-50 — A liquid solvent detergent used in power washers for cleaning between machining operations and prior to inspection. It is neutral, and paint can be applied over it. From 50% to 60% less costly than chlorinated solvents.

• Wyandotte Service Representatives are skilled in solving cleaning problems of all kinds. They are constantly finding short cuts and helping to eliminate cleaning bottlenecks. A call for their assistance places you under no obligation.



THE J. B. FORD SALES COMPANY, WYANDOTTE, MICHIGAN

WPB Halts Work On Ordnance Plant

• • • Acting under the policy of curtailing the use of materials for construction projects, the War Production Board Nov. 28 ordered the immediate stoppage of all work incidental to the construction and equipment of the \$45,000,000 expansion for the Continental Ordnance Plant at Hammond, Ind.

The project, designed to produce

and machine heavy steel castings was authorized Aug. 12 and work was begun immediately by the Continental Ordnance Corporation of East Chicago, Ind. Value of construction in place is approximately \$1,000,000.

The Army, which sponsored the project, has concurred with WPB on the stoppage order.

It will be recalled that Chairman Donald M. Nelson on Oct. 21 announced the policy of drastically

curtailing construction programs in order to make materials available for direct military use and for such essential programs as the rubber, high-octane gasoline, aviation, aluminum and alloy steel expansion programs.

Furthermore, all construction programs, under the policy, must balance with production programs and the proposed expansion at Hammond would not be completed in sufficient time to justify the large expenditure of critical materials.

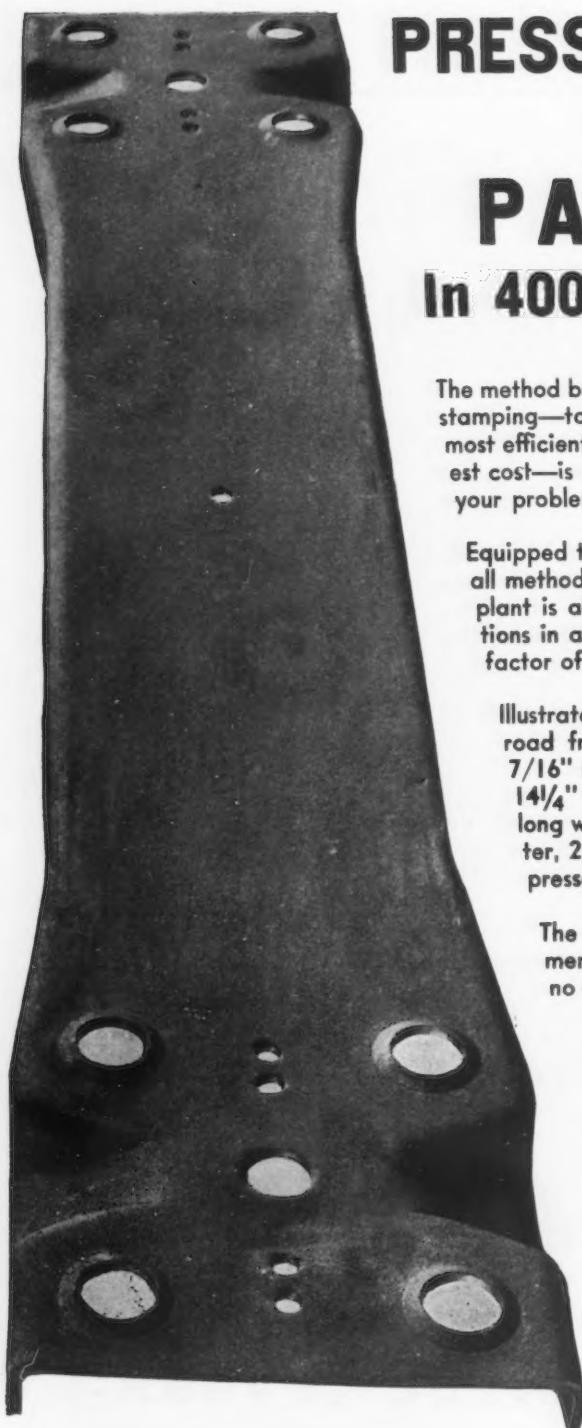
Tri-Union Authority Stumps Thompson Heads Cleveland

• • • "Button, button, who's got the button," is a game that will be played regularly now at the main plant of Thompson Products, Inc., because of the decision of the War Labor Board that the company will have to deal with three unions, the CIO, AFL, and an independent, all of which have been given authority to negotiate grievances. The unions will act only with respect to their own membership, and the procedure, as outlined by the WLB, is believed to be the first of its kind.

The limited recognition accorded the CIO United Auto Workers, the AFL Machinists, and the unaffiliated Brotherhood of Independent Workers is to continue until the National Labor Relations Board finally determines the appropriate bargaining agency.

The plant management, according to Ray Livingstone, personnel director, will stand "in the cross-fire of three competing unions, each striving to outdo the other in presenting grievances." It was urged that the board settle the majority question so that collective bargaining could be resumed, but the CIO is supposed to have rejected the election challenge of the independent union, stating at a WLB hearing that it would not consent to an election.

Both the CIO and AFL unions lost a Labor Board bargaining poll at the Thompson Cleveland plants last May. The CIO-UAW has since won a fight to obtain disestablishment of another independent union, the Automotive and Aircraft Workers' Alliance, as a company-dominated union and now contends that the Brotherhood of Independent Workers is a successor organization.



PRESSED COLD by PARISH In 4000 ton Press

The method best suited for each particular stamping—to insure most effective results, most efficient production and most modest cost—is employed when you present your problems to the Parish plant.

Equipped to handle all types of work in all methods and sizes of stamping, our plant is able to meet your specifications in all its elements, including the factor of time.

Illustrated is a Spring Plank for railroad freight car trucks. Made of 7/16" metal—16 5/8" wide at ends, 14 1/4" wide at center and 93 1/4" long with flanges 3 3/8" high at center, 2 3/16" high at ends—it was pressed cold from heavy steel.

The submission of your requirements for review involves you in no obligation.

PARISH
PRESSED STEEL CO.

READING, PENNA.

Pacific Coast Representative
F. Semers Peterson Co.
57 California St.,
San Francisco, California

We have turned our facilities over entirely to the manufacture of various products required by the United States Government and American Railroads.

NEWS OF INDUSTRY

Pig Iron Allocations

Highest in Months

Philadelphia

• • • Allocations of pig iron in this district reached a new high this month, topping all previous records since the beginning of allocations with an approval of about 80 per cent of the requested amounts in contrast with the more customary 50 to 60 per cent allocations.

This change in policy is attributed mainly to the fact that many pig iron users such as stove makers, sanitary pipe and bath tub manufacturers have been cut out completely from allocations, leaving a greater amount to be distributed among those foundries having war orders.

Inventories, too, are having a great effect upon the approval or disapproval of pig iron requests as is exemplified by the nearby Navy Yard request which has been rejected for at least four months due to an excessive inventory.

A certain amount of redistribution is also being practiced in pig iron. One foundry here, engaged in war work, was dumbfounded to learn that no iron has been allocated to them this month, only to be advised later that they were being assigned the iron inventory from another foundry which was being temporarily suspended from operation.

British May Move

Some War Plants

• • • Under the new plans, recently put forward by the British Minister of Production, Oliver Lyttelton, for the re-organization of British war industry, many firms, large and small, may face further governmental control which may, in some cases, involve their bodily removal to new areas. In heavily congested districts firms not tied necessarily to the district may have to move machinery and a few key workers and start operating in a less congested area.

Small firms may have to undergo new "groupings of affiliations" to bring about a larger and more economical unit of production. Other small firms whose "resources or technical ability are too meager to permit the productivity needed" may have to close, releasing their labor for more efficient firms.

These new plans are symbols of

Britain's full mobilization. In the period after Dunkirk it was vital to use any productive unit, large or small, that lay to hand. Today increased production can be obtained only by "reallocation of contracts" and many other devices to avoid bottlenecks or overloading.

These and many other aspects of Britain's war production program are discussed in detail in a new (free) 32-page booklet—"Industrial Mobilization of Great Britain"

—published today by the British Information Services, 30 Rockefeller Plaza, New York.

Republic Contract Let

Farmingdale, N. Y.

• • • Republic Aviation Corp., Farmingdale, L. I., N. Y., announces a DPC contract for additional plant facilities in New York at a cost in excess of \$5,000,000, making a total commitment of more than \$16,000,000.



The modern Fairfield plant at Lafayette, Indiana, houses some of the finest gear production facilities in existence.

GEARS made to order—large and small, special and standard—spiral bevel, straight bevel, herringbone, hypoid, spur, helical, worms and worm gears, differentials—all made to the highest standards of quality and accuracy. Fairfield is working 24 hours a day, 7 days a week, producing gears for many of America's largest war equipment producers. Remember the name FAIRFIELD, for Fine Gears!

TYPICAL PRODUCTS FOR WHICH FAIRFIELD FURNISHES GEARS

TRACTORS • TRUCKS
OUTBOARD MOTORS
DIESEL ENGINES
ROAD GRADERS
MACHINE TOOLS
POWER SHOVELS
COMBINE HARVESTERS
WINCHES
MILITARY EQUIPMENT

FAIRFIELD
MANUFACTURING COMPANY
305 S. Earl Avenue • Lafayette, Indiana

NEWS OF INDUSTRY

Big Pipeline Steadily Nearing Completion

• • • The Texas-Illinois leg of the 24-in. war emergency pipeline moved 70 miles nearer completion during the last two weeks, despite heavy rains that retarded construction on the northern stretches of the project, Petroleum Coordinator for War Harold L. Ickes announced Nov. 26.

With more than 465 miles of the

"big inch" line in the trench between Longview, Texas, and Norris City, Ill., 85 per cent of the pipe-laying on the first leg is complete.

Rain, flood and mud have hampered the working crews persistently during the last 14 days.

Two contractors will complete work this week on their portions of the Texas-Illinois leg of the line and will start moving crews and equipment to construction sites along the 857-mile eastbound ex-

tension from Morris City, Ill., to the New-York-Philadelphia terminals of the line. Construction work on ten pump stations is progressing rapidly.

November Construction Up; Federal Work Reaches 92%

New York

• • • November engineering construction volume totaled \$607,622,000, the highest November value ever reported by *Engineering News-Record*. The total averaged \$151,906,000 for each of the four weeks of the month, an increase of 74 per cent over November last year, and 10 per cent above the average for the five weeks of October, 1942.

Federal construction accounted for 92 per cent of the November figure, and was up 153 per cent compared with a year ago, and climbed 13 per cent over the average for a month ago. Public work, feeling the effect of the federal gains, rose 106 per cent above the 1941 month and 10 per cent over the preceding month, despite the respective 72 and 44 per cent declines in state and municipal volume. Private construction was 55 per cent below November, 1941, but was up 4 per cent compared with October, 1942.

Bethlehem Issues Call On 7½-Million in Bonds

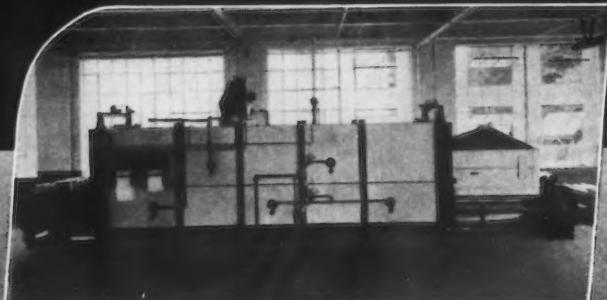
New York

• • • Bethlehem Steel Corp. issued a notice this week to holders of \$7,500,000 of 6 per cent purchase money mortgage bonds due Aug. 18, 1998, offering to redeem the bonds on or before Dec. 15 at 181 flat or \$1,810 for each \$1,000 bond. This action is seen as a move to eliminate the corporation's non-callable debt and to make use of the provisions of the 10 per cent tax credit embodied in the Revenue Act of 1942.

According to William J. Brown, treasurer, the 6 per cent bonds if held to maturity, would yield about 3 per cent annually at the price of the offer. Bond holders will receive the payment price of the bonds upon delivery of their holdings at any time on or before Dec. 15 either at the Girard Trust Co. or the Pennsylvania Co. for Insurances on Lives and Granting Annuities both of Philadelphia.

Heat-Treating

STEEL Shell Cases



The substitution of steel for brass in the manufacture of cartridge and shell cases required considerable research in the selection of a suitable deep drawing steel having the desired physical properties.

Of equal importance is the selection of Heat-Treating Equipment capable of uniformly producing cases in which these properties have been retained.

R-S Furnaces for intermediate and final anneals will meet the most exacting requirements. Ask for details and constructive suggestions.

FURNACE DIVISION

R-S PRODUCTS CORPORATION
4524 Germantown Ave., Philadelphia, Pa.

R-S Furnaces of Distinction

Annealing • Car Hearth • Continuous Conveyor
Forging • Billet Heating • Plate and Angle Heating
Convection • Rotary Hearth • Salt Bath • Metal Melting

BUY WAR BONDS

Duluth Established As Basing Point for Basic Pig Iron

• • • OPA established Duluth, Minn., as a basing point for basic pig iron, effective Dec. 4. The maximum price there will be \$24 per gross ton, which is 50c. below the already established base of \$24.50 for No. 2 foundry pig iron at Duluth.

The action was taken after an appeal from American Steel & Wire Co., subsidiary of United States Steel Corp. The company, at the request of the government-owned Defense Plant Corp., moved a blast furnace from Joliet, Ill., to Duluth and is operating it there as a lessee of Defense Plant Corp.

While the furnace can make foundry and malleable grades, it may also make basic iron if so directed by WPB.

The price was established by Amendment 3 to Price Schedule 10.

Fluorspar Ore Action

• • • Fluorspar ores were freed from price control by OPA Nov. 28 in another action toward facilitating expansion of production. The step was taken in Amendment 42 to Supplementary Regulation No. 1 of the GMPR.

Western Coke Price Up

• • • Action to prevent threatened shortages of coke needed by West Coast shipbuilders was taken Nov. 25 by OPA.

Maximum prices for first grade beehive oven coke produced at Sunnyside, Utah, were increased. The price of first grade coke from the beehive ovens of the Utah Fuel Co. plant at Sunnyside, Utah, was raised from \$6.50 per ton to \$7.50 per ton.

The action is provided in Order No. 2 under Maximum Price Regulation No. 121 and was effective Nov. 25.

Aircraft Repair Parts

• • • Manufacturers of aircraft and aircraft engines need not file with OPA their prices for repair parts or specially designed airplane servicing and repair tools

for which maximum prices are established in Maximum Price Regulation No. 136, as amended (Machines and Parts and Machinery Services).

The same privilege is extended

to all other manufacturers of machines and equipment which, like airplanes, are not subject to Maximum Price Regulation No. 136, but who make repair parts or specially designed maintenance and repair tools which are subject to the regulation.

This action was taken in Amendment No. 56 to Maximum Price Regulation No. 136, as amended. The amendment becomes retroac-



Let's GET GOING

THE kids over the land know the importance of getting every pound of scrap into service—all of us in industry must make desperate efforts to collect scrap wherever it is, in plants, in yards, on farms—everywhere.

It means that obsolete equipment must get the axe—there can be no hedging. Old metal that does not work is a total waste at this time.

We know the critical condition for we use tons and tons of scrap to make crankshafts and other heavy forgings for the Nation's "Ships for Victory" Program. All of us know the urgency, so let's get going.

Even the kiddies know
that every pound of scrap
is needed --- **THROW YOUR SCRAP IN THE FIGHT**



ERIE FORGE COMPANY, ERIE, PA.



PRICES

tively effective to July 22, 1942, the effective date of the regulation.

Additional Price Actions

• • • A formula for developing manufacturers' ceiling prices for plastic screening has been set by OPA, effective Nov. 25, in Order 146 under the General Maximum Regulation. The level is based on costs in effect March 31, 1942.

Adjustable pricing for sales of formaldehyde, lithopone, titanium pigments and acetic acid was established Nov. 27 to aid sellers and buyers on long term contracts. Amendments to the four price orders governing the products are effective Dec. 2.

A maximum price of 10c. each for used 100-lb. calcium carbide drums, which packers would like to buy and refill again was established Nov. 25.

Price Regulation 236 covering heating boiler conversion parts has been revised effective Nov. 25 to bring it in line with trade practices.

Makers of cast iron boilers and radiators who maintain their own jobbing outlets performing the same function as independents, may receive the same maximum prices as the regulations now permit for independent jobbers, OPA ruled Nov. 28, in Amendment No. 1 to Regulation 272.

Manganese Ore Prices

• • • Metallurgical manganese ore with a manganese content of 40 per cent or less by weight, was exempted from price control by OPA Nov. 30. Hitherto ore of 35 per cent or less manganese content was exempt.

In total metallurgical ore consumption, the percentage of ore utilized with a manganese content less than 40 per cent is small. It can be used in standard ferromanganese production only when blended with a large proportion of ore with much higher manganese content.

So that domestic production of manganese ores with less than 40 per cent manganese will not in any way be hindered by price ceilings, it was decided to exempt from price control metallurgical ores with a manganese content of 40 per cent or less.

The broadened exemption is contained in Amendment No. 1 to Maximum Price Regulation No. 248, and effective Dec. 1.

TVA Sales Exempt

• • • Sale of phosphorous by the TVA to the War Department has been exempted from price control, effective Dec. 5 in Amendment 13 to Supplementary Regulation No. 4, effective Dec. 5.

Order 136 Amended

• • • Amendment 57 to Price Order 136, effective Dec. 1, revokes paragraph (b) (1) of section 25 of the regulation.

Amendment 58, effective Nov. 26, excludes sales or deliveries to any U. S. agency of any complete plant for tire making, and sales of stills to the Defense Plant Corp.

Several other minor amendments have been made to this price order recently.

ECONOMIZE ON ZINC

with

MEAKER PROCESS

for Electro-Galvanizing Wire



more profit with Meaker Process for Electro-Galvanizing Wire.

"A proven success by every test"

WE INVITE YOUR INQUIRY

The MEAKER Company

1635 South 55th Avenue, Chicago

Railroad Steel Redistributed; Surpluses Go to '43 Program

• • • An attempt to locate surplus tonnages of steel obtained under the priorities system was seen in a WPB announcement last week. WPB said that excess inventories of steel and other materials accumulated in 1941 and early 1942 by railroad car builders are being absorbed in the equipment program for 1942 and 1943 by controlled redistribution of the surpluses under Order L-97-a-1 which was amended by a supplementary order broadening the existing inventory controls.

Restriction which previously applied only to inventories of freight car builders are now extended to include those of passenger car producers, while excess inventories of car shops in both branches of the industry also are made available to locomotive builders. No passenger cars were included in authorized equipment which the carriers may order for 1943 under a program determina-

(Questions Answers to questions on CMP see page 120.)

tion by the Requirements Committee of WPB, announced Nov. 19. Inventories of materials now in the hands of passenger car builders hence cannot be put to use for that type of manufacture. The supplementary order (L-97-A-1, as amended) provides for orderly disposition of these "frozen" inventories.

Heretofore, the excess inventories of freight car builders could only be sold and delivered to other builders in the same branch of the equipment industry. The amended order, however, permits sales and deliveries either by freight or passenger car builders to any one of three classes of consumers. These are: (1) other freight car builders, (2) locomotive builders, or (3) manufacturers of parts for freight cars and locomotives.

Much of the steel and other supplies now classified as excess inventory were acquired in anticipation of projected construction prior to the date when restrictions were placed on the number of cars and types of equipment that might be manufactured. Following the outbreak of war in the Pacific last December, a readjustment of shop production schedules became

necessary all along the line. In order to control schedules of car builders so that the number of cars on order would be kept in balance with the supply of materials and so that types constructed would be in accordance with most

urgent needs, the Director General for Operations in April, issued L-97-A.

Builders whose material receipts were appreciably ahead of production schedules found themselves with sizable inventories of materials much of which were intended for use in box cars that were not included in the authorized construction. The order prohibited producers from using such



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THE SUPERIOR SHEET STEEL TRADE MARK REGISTERED CANTON, O.

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SHEETS

Sold under well-known trademarks, Continental-Superior steel sheets are made with more than 30 different kinds of surface treatments, finishes and coatings to suit the individual needs of manufacturers and sheet metal workers.

The Superior Sheet Steel Co., Canton, Ohio
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HEAT-TREATED STEEL SHOT

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

We manufacture
shot and grit for
endurance

**Heat-Treated Steel Shot and
Heat-Treated Steel Grit**

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.



**HARRISON
ABRASIVE
CORPORATION**
Manchester, New Hampshire

HEAT-TREATED STEEL GRIT

P R I O R I T I E S

material in the fabrication of authorized cars.

A later order, L-97-A-1, authorized producers to sell and deliver their excess materials to any other builders of freight cars. The purpose of the supplementary order was to permit balancing of inventories between producers by sale or exchange so as to assure maximum utilization of available supplies.

WPB said that the emphasis at present is on the side of locomotive construction. The supplementary order is expected to accomplish a continuous balancing of inventories by permitting similar sales and exchanges in all departments of the business, including passenger and freight car shops, locomotive works and parts manufacture.

Gilding Metal Clad Scrap
Washington

• • • Gilding metal clad steel scrap, a copper-zinc alloy used in munitions manufacture, was exempted from price control on Friday by OPA. As the reason for exempting this item OPA said the volume of gilding metal clad steel scrap at shell case plants is growing but the material in its unprocessed form is not now used commercially. Processes for separating the steel and copper in the scrap economically so that they may be reused as scrap and refined copper are being developed. Only one process, OPA said, has advanced beyond the experimental stage and that process has not been put into industrial use. In view of the newness of the process, there is not enough cost data available to determine a fair price for this scrap.

Farm Tool Order Revision
Washington

• • • Several important changes were made in the WPB limitation order establishing control over production of farm machinery and equipment, by the issuance on Nov. 25 of a revision of L-170.

Among the changes brought about are the following:

It eliminated the requirement of obtaining an export license or Lend-Lease authorization prior to manufacturing farm machinery and equipment for export, and substitutes a requirement of approval

PRIORITIES

by WPB of production schedules for export.

It redefines the term "producer" to remove the exemption granted to all those whose anticipated production quotas would not exceed \$10,000.

It transfers the production of silos from a weight basis to a unit basis.

It clarifies the substitution provision as to the use of plywood by indicating the type of binder which is permitted.

It makes a number of changes in Schedule A to increase production quotas by one-third for "non-concentrated" items (tractors, tractor-mounted implements, combines, harness hardware and hand tools).

It raises the production quota for power sheep shearing machines (Item 299—Schedule A) from 75 per cent to 100 per cent.

WPB Industry Advisory Unit Director Resigns

Washington

• • • Effective Dec. 15, T. Spencer Shore has resigned as Director of WPB Industry Advisory Committees. He will return to active service as vice president and treasurer of the General Tire & Rubber Co., Akron, Ohio, but will continue as a WPB consultant, subject to call for special assignments. Mr. Shore will be succeeded in his WPB position by Barry T. Leithead, Scarsdale, N. Y., who has been principal industrial adviser in the Division of Industry Advisory Committees. Mr. Leithead is on leave of absence from Cluett, Peabody & Co.

At present 485 Industry Advisory Committees are acting in an advisory capacity for the various WPB divisions.

New Zinc Curtailment

Washington

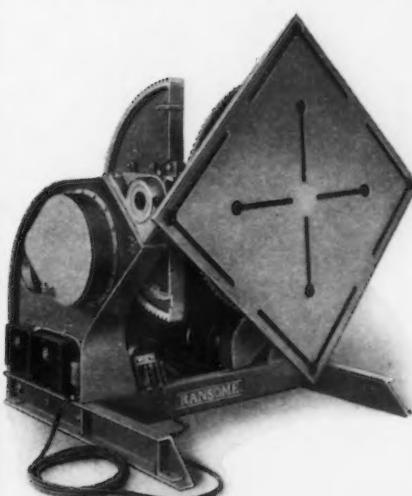
• • • WPB last Friday took steps to further curtail the use of zinc with the issuance of Order M-11-b . amended. The order further restricts use of zinc for the manufacture of a variety of automobile parts, building and industrial materials. A clarification in the language of the order makes it clear that galvanizing and protect-

The advertisement features a large pie chart divided into six segments. The largest segment, colored black, is labeled "EXPERIENCE". The other five segments are labeled clockwise from top: "THE RIGHT MATERIAL", "TOOL DESIGN", "MANUFACTURING EQUIPMENT", "TESTING", and "HEAT TREATING". To the right of the pie chart, the text "WHAT CONSTITUTES GOOD SPRINGMAKING PRACTICE?" is written in large, bold, capital letters. Below this, a silhouette of a man's head and shoulders is shown facing left, looking at the pie chart. To the right of the silhouette, the company name "Dunbar Bros. Co." is printed in large, bold, serif capital letters. Underneath it, in smaller text, is "DIVISION OF ASSOCIATED SPRING CORPORATION", "BRISTOL, CONNECTICUT", and the slogan "Quality Springs Since 1845".

Of all the factors that are involved in springmaking, by far the largest slice is contributed by experience. Before you make hard-and-fast specifications for springs, let Dunbar experience analyze your requirements. It has often paid off in the form of simplified design, savings, and better performance. In our experience, nothing can take the place of experience.

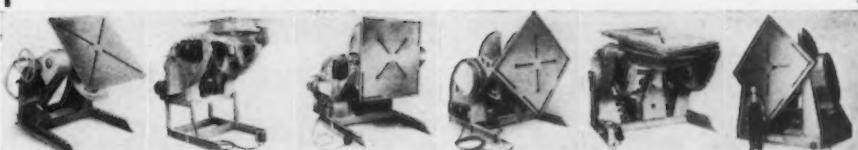
FOR ALL DOWNHAND WELDS

... a tilting range
of 135 degrees
from horizontal



With a tilting range of 135 degrees from horizontal, Ransome Positioners provide the means to weld DOWNHAND any and all welds no matter how complicated the piece to be welded.

Reports from many users indicate valuable time savings . . . which means more welding production in a given time over methods formerly used. Give us your welding production problems—our engineers will supply the answers.



Capacities from Light Duty Hand-Operated to 20 ton Motor-Operated

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P R I O R I T I E S



Working Tools

• Designers, production and purchasing men make good use of Booth's combination felt application chart and sample file. Contains actual swatches of all S.A.E. felt types . . . felts which (when precision die-cut into Booth mechanical felt parts) serve exacting aircraft and other key industries.

Complete specification tables are included . . . and the kit is bound standard file size. Write for it...no obligation . . . no sales follow-up.

THE BOOTH FELT COMPANY
477 19th Street, Brooklyn, N. Y.
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1907



ing coating is included in the restrictions.

Health supplies, precision instruments and dies necessary to the war industry are placed in the non-restricted class and may be made with zinc. Prohibition on the use of zinc in stoker repair and maintenance parts is relaxed to allow use of 50 per cent of the amount used in 1941. Likewise, restriction on the use of zinc in functional and mechanical items for gasoline and diesel engines is eased.

The limitation on plating and protective coating says that no items on list "A" or "A-1" of the order may be made of metal coated with zinc and that none of the scores of items on the list may be coated with zinc. Paint is excepted. For all items not included on the list made for civilian purposes, not more zinc may be used than 75 per cent of prime western or 50 per cent of any other grade used in the corresponding quarter of 1941.

Among the products in which the use of zinc is forbidden entirely by the amended order are locking devices for auto wheels, tires and gasoline tanks; barrel and drum plugs; different types of building

materials and paper product dispensing machines not previously covered. A special reduction is made on use of zinc in automotive and tractor carburetors and fuel pumps for repair and maintenance purposes to one half the amount used in 1942. The new prohibitions on these items become effective Nov. 30.

Tungsten under Full Control

Washington

• • • All tungsten wire, sheets, rod and powder were placed under complete control by WPB last Friday when Order M-29 was amended. This will mean that permission to use the forms of the metal mentioned will have to be secured before it may be put in process. Previously unrestricted deliveries of tungsten up to 25 lb. of the contained metal monthly have been allowable.

Mining Machinery Listings

Washington

• • • Gold mines, which are being closed under Order L-208, and whose machinery was frozen by an amendment to this order on Nov.

THE NEW SPITFIRE: This is the improved Vickers Super-marine Spitfire which the R.A.F. is now using. It is powered by a Rolls-Royce Merlin 61 engine driving a four-bladed propeller and carries two cannon (see wings) and four machine guns.

Press Assoc. Inc. Photo



PRIORITIES

19, are required to file lists of frozen machinery with WPB on or before Jan. 18, 1943, by the terms of the third amendment to the order issued last week by WPB.

When the amendment freezing machinery was issued, it required that lists of frozen machinery be filed with WPB either by Nov. 19 or 60 days from the date on which the order became applicable to any given mine. This was an error, WPB said. The order as amended gives mine operators until Jan. 18, or 60 days after the effective date of the order, whichever is later, to file these lists.

TVA Priority Ratings for Power Units Revoked

Washington

• • • In line with its policy of curtailing the flow of critical materials to construction projects, the WPB on Monday revoked priority ratings previously granted to the Tennessee Valley Authority for the construction and installation of five power generating units at three locations having a total of 190,700 kilowatts. The units had been scheduled for completion in 1944.

TVA projects ordered stopped were:

1. Hydro generating units Nos. 3, 4 and 5, each with a capacity of 32,000 kilowatts, at Kentucky Dam on the Tennessee River near Paducah, Ky. Units Nos. 1 and 2 at the same dam are not affected and are scheduled for completion in 1943.

2. Steam turbine generating unit No. 4 of 60,000 kilowatt capacity at the Watts Bar steam plant in East Tennessee. Units Nos. 1 and 2 are already in operation and No. 3 is scheduled for completion in 1943.

3. Hydro generating unit No. 3 of 66,700 kilowatt capacity at the Fontana Dam on the Little Tennessee River in North Carolina. Units No. 1 and 2 are not affected.

Enameling Ware Restriction

Washington

• • • Restrictions on production of various types and sizes of enameled ware imposed by Order L-30-b do not apply to military orders for use in the field or on shipboard, the WPB stated last Tuesday.

In an interpretation (No. 1) to

"Right Angle" or Wrong Angle

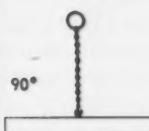
Check the load

Do your men know what you know—that as you reduce the angle of sling chains you lower their carrying capacity? For a simple, quick way to compute the safe load from 90° to the risky, small angles, consult the table at the right. Other important precautions which will prevent accidents and save chain will be sent you on request. And we'll gladly help you with your wartime chain problems if you'll put them up to us.

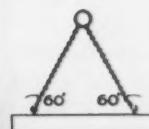
American Chain



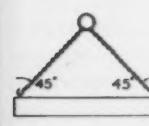
How to Find the Safe Working Load for Sling Chain at Different Angles



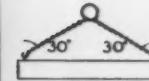
To find the safe working load for a Single Sling Chain at 90° angle—multiply the manufacturer's recommended safe working load by 1.



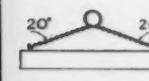
For a Double Sling Chain at 60° angle—multiply by 1.732.



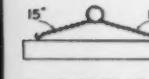
For a Double Sling Chain at 45° angle—multiply by 1.414.



For a Double Sling Chain at 30° angle—multiply by 1.000.



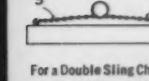
For a Double Sling Chain at 20° angle—multiply by 0.684.



For a Double Sling Chain at 15° angle—multiply by 0.517.



For a Double Sling Chain at 10° angle—multiply by 0.346.



For a Double Sling Chain at 5° angle—multiply by 0.174.



AMERICAN CHAIN DIVISION
York, Pa., Boston, Chicago, Denver, Detroit, Los Angeles,
New York, Philadelphia, Pittsburgh, San Francisco

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

P R I O R I T I E S

Order L-30-b, (enameled ware), the Director General for Operations ruled that a manufacturer who, for example, is allowed to make for civilian or general military use only one size of a pail in a permitted range of sizes, is not subject to the limitation if he is producing pails for use in the field or on shipboard.

The interpretation also clarifies the provisions relating to restrictions on the use of iron and steel in the manufacture of enameled ware. In instances when one manufacturer fabricates the steel into black shapes and another manufacturer applies the vitreous enamel coating, both are considered to be using iron and steel under the quota provisions of the order. Therefore, they both must include the iron and steel involved under their individual quotas.

However, in computing their quotas, they are entitled to include in their base period consumption both the raw material they used for production of black shapes and fabricated material they received from another manufacturer.

Vacuum Cleaner Attachments

Washington

• • • Vacuum cleaner attachment production was halted last Thursday by WPB in an amendment to Order L-18-b. The curtailment also applies to purchase orders made by the armed services and other governmental agencies.

Safety Goggle Amendment

Washington

• • • WPB last Friday said that nickel-plating and nickel silver could be used in the manufacture of specified parts of spectacle type safety goggles in an amendment to Order L-114.

Military Use of Stainless Exempt from M-126 Order

• • • The use of stainless steel in several products needed by the armed forces has been permitted by M-126, as amended Nov. 30.

Items placed on the exception list include: ammunition boxes, and

chutes; boiler casings; cable terminals; fittings and turnbuckles; chains and cables; control levers; hot water heaters; tanks and coils; identification tags; antennas; powder boxes; stock pots; canteens.

The order also exempts Army-Navy-Maritime orders for stainless which have been approved on form PD-391 for fourth quarter melting and delivery.

CMP Explained at Regional Clinic

Philadelphia

• • • A regional clinic to explain the Controlled Materials Plan was held at the Hotel Benjamin Franklin on Dec. 1. H. L. Prentis, Jr., president of Armstrong Cork Co., former NAM president and now deputy regional director of WPB gave the keynote address of the meeting followed by Orville H. Bullitt, regional director, and T. Johnson Ward, deputy regional director for priorities and appeals. A detailed discussion and explanation of the Controlled Materials Plan

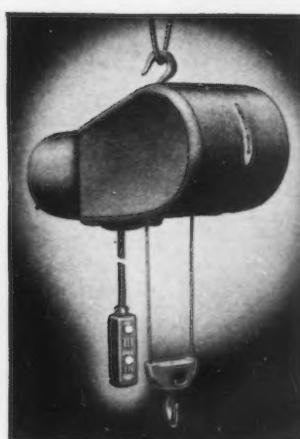
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3-Motor Single Girder
CAB OR FLOOR
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Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Headroom Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.



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Bullders Of Conco Torpedo Electric Hoist

Write for Bulletin 2600C describing the Torpedo Hoist shown. Three capacities: 250 lb. — \$139.50, 500 lb. — \$149.50, 1000 lb. — \$159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.

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Handling!*

Motor and reducer mounted on heavy base plate . . . — Gears fully enclosed; operate in oil bath . . . — Floor or Cab operated . . . — Mechanical or electric brake . . . — Quick operation . . . — Bridge extensively cross-braced . . . — Hyatt Roller bearings . . . — Alemite lubrication . . . — Rolled steel girder . . . — Drum type or Push Button controllers . . . — Heat treated axles, pin and keeper type box section trucks.

P R I O R I T I E S

This Week's Priorities and Prices

Excess inventories of steel and other materials accumulated by railroad car builders are being absorbed in the equipment program for 1942-3 by controlled re-distribution of the surpluses under Supplementary Order L-97-a-1 as amended Nov. 24 to broaden the scope of existing inventory controls. (T-1273)

Aircraft and aircraft engine manufacturers need not file their prices for repair parts or specially designed airplane servicing and repair tools for which maximum prices have been established, according to Amendment No. 56 to Maximum Price Regulation No. 136, retroactively effective to July 22. (OPA-T-337)

Use of zinc in manufacture of automobile parts, building materials, and industrial materials has been further restricted by amended order M-11-b. (WPB-2178)

Gilding metal clad steel scrap has been exempted from price control with the issuance of Amendment No. 43 to Supplementary Regulation No. 1 to the General Maximum Price Regulation, effective Nov. 16. (OPA-T-362)

Cast iron boiler and radiator manufacturers who maintain jobbing outlets performing the same function as independent jobbers may receive the same maximum prices as the regulations now permit the independent jobbers, through Amendment No. 1 to Maximum Price Regulation No. 272. (OPA-T-374)

A maximum basing point price of \$24 per gross ton for basic pig iron at Duluth, was established in Amendment No. 3 to Revised Price Schedule No. 10, effective Dec. 4. (OPA-T-360)

Scrap dealers and industrial companies are required by Order L-88 to secure permission for the sale of scrap and re-rolling rail in excess of 10 tons a month, it is emphasized by the Steel Division. (T-1263)

For copies of above announcements address Office of War Information, Washington, giving announcement number as shown in parentheses after each paragraph. (For example, WPB-600 means announcement 600 issued by the War Production Board.)

Revisions to The Iron Age Priorities Guide

• • • The following data, together with all intermediate weekly revisions in THE IRON AGE, should be added to THE IRON AGE Priorities Guide published with the issue of October 8 to bring the Guide up to date.

"M" Orders:

M-11-b...Amended order further restricts use of zinc in manufacture of variety of automobile parts, building materials, and industrial materials (11-27-42).

M-29...Amended order places all supplies of tungsten, wire, rod, sheet and powder under complete allocation control (11-27-42).

M-43-a...Amended order forbids manufacture and use of tin oxide (11-24-42).

M-115...Amendment No. 2 (11-24-42) adds morphine for hypodermic injections to list of items on Table 1 of order.

"L" Orders:

L-18-b...Amended order prohibits production of attachments for domestic vacuum cleaners (11-27-42).

L-30-b...Interpretation No. 1 (11-24-42) states that restrictions on production of various types and sizes of enameled ware do not apply to military orders for use in the field or on shipboard.

L-81...Amended order prohibits production of toys or parts for games containing certain metals and other critical materials except joining hardware made out of iron or steel (11-25-42).

L-97-a-1...Order amended to broaden scope of existing inventory controls on steel and other materials accumulated by railroad car builders (11-24-42).

L-114...Amended order permits use of nickel plating and nickel silver on certain specified parts of spectacle-type safety goggles (11-27-42).

L-123...Amended order requires certificate reciting nature of the purchase to accompany purchase orders for necessary repair and maintenance parts for many items of general industrial equipment (11-23-42).

L-170...Revised order makes important changes in controls over production of farm machinery and equipment (11-25-42).

L-176...Interpretation No. 1 (11-23-42) makes clear that sales of parts for portable electric fans in kits or other form is a violation of order.

L-208...Amendment (11-25-42) requires reports of available machinery to be filed by January 18 or 60 days after applicability of order.

was given by Percy W. Whiting of the WPB Controlled Materials Plan Branch.

L-123 Clarified

• • • The effective date of Limitation Order L-123, as amended, establishing control over repair and maintenance parts of general industrial equipment, is Dec. 1, 1942, as stated in the printed order, not Dec. 8, as stated in the release T-1255, dated Nov. 23.

Tin Oxide Uses Hit

• • • Manufacture and use of tin oxide were completely forbidden Nov. 24 by an amended version of Conservation Order M-43-a. The order formerly permitted its use on orders bearing a rating of A-1-k or higher. The amended order also limits the amount of tin which may be used in coating for foundry chaplets to 5 per cent or less.

Wyoming Sponge Iron Plant Approved by WPB

Washington

• • • Senator O'Mahoney (D.—Wyo.) said on Tuesday that a pilot sponge iron plant would be built at Laramie, Wyo. The Senator said that the WPB Facilities Review Committee had approved the procurement of materials for the construction of the plant.

The plant of 50 ton capacity will be operated and engineered by the Bureau of Mines. The Bureau of Mines or Barrett process will be employed. This involves the feeding of iron ore and coke into the kiln. The resulting mass is discharged, magnetically separated and briquetted.

The Laramie project ores will be sintered at Pueblo. This ore is described as a soft hematite 54 per cent iron. The Bureau of Mines claims that hand-sorted

lumps run as high as 64 per cent iron content.

For coal supplies it is expected that Colorado sub-bituminous and coking coal in Southern Colorado will be used. Wyoming coals in the western part of the state near Rock Springs, including coal procured from the Hanna field, will likewise be sent to the Laramie project.

Steel Division to Have Transportation Section

• • • In a move to aid in the elimination of wasteful transportation practices in the steel industry, H. G. Batcheller, Director of the Steel Division, announced Nov. 30 the establishment of a Transportation Section within the Division.

E. G. Plowman, Traffic Manager of the Colorado Fuel and Iron Corp., was named chief of the section. Mr. Plowman's home is in Denver, Colorado.

SCRAP

Scrap . . .

(CONTINUED FROM PAGE 155)

much scrap, especially light material collected in the recent school campaign and cast produced in wrecking old plants and buildings, which they are refusing to accept, leaving dealers to hold it. Since Thanksgiving there has been a slowing down of receipts.

CHICAGO—The picture here continues favorable from the short term view, but is still confusing with respect to long

Far West scrap is moving to the Chicago district, says West Coast column, page 78.

term prospects. Few mills have enough backlog to carry through the winter. It is stressed that industrial and rural scrap drives must be maintained.

CINCINNATI—Consumers are co-operating by taking as much scrap as they are physically able to handle. Dealers say a number of consumers are now beginning to complain over the quality of scrap sent to them.

BUFFALO—An industrial scrap drive with 300 firms participating added 5222 tons of iron and steel to local yard stocks from Oct. 20 to Nov. 20. In the last three months, 471 auto graveyards in this area wrecked 37,722 cars and moved 28,892 tons of scrap. City junkmen have agreed to pay a minimum price of three cents a

pound for mixed scrap and more if quality warrants.

DETROIT—Movement of voluntarily donated scrap from depots, slowed down because of manpower shortages of scrap dealers, was speeded up this week by enlistment of one-truck operators and other small dealers. It is estimated 1000 to 1500 tons of scrap have been accumulated at gasoline stations and other automobile trade establishments.

BOSTON—New England industrial salvage in October amounted to the record-breaking total of 269,227,165 lb.

CLEVELAND—While the movement of scrap to Cleveland and Youngstown mills continues to hold up, it would be foolish to believe that such quantities as will permit uninterrupted operations during the winter months are accumulating. Between two weeks and one month supplies are on hand, but with the setting in of cold weather, the movement is expected to be curtailed. Consequently, within a short time mills in the area will be as bad off for scrap as they were early in the year, and if the weather is severe, a critical situation will probably arise.

PHILADELPHIA—Shipments here are reported to have reached and slightly passed the peak which has been building up for the past six weeks. While still high, yard shipments are slower and some yards are said to be searching for new scrap; indicating that most of the backlog from recent scrap drives has been moved. All mills report a comfortable supply averaging over six weeks' backlog.

OUT OF THE SCRAP PILE: Women at Vultee Aircraft's Southern California plant sort rivets, nuts and bolts recovered through magnetic separation of scrap and floor sweepings. All undamaged items recovered are segregated by the women and sent back to the production line.

Globe Photo



WPB Begins Drive to Get Jalopies into Graveyards

Washington

• • • With auto graveyard supplies sinking to only 277,234 cars, after conversion of 4,000,000 into scrap since Feb. 1, a replenishing drive has been instituted by WPB. The movement seeks to develop on a nationwide basis the work that the American Legion is doing in a house-to-house, farm-to-farm canvass in the northeast and Middle-West sections where it is urging that abandoned autos or those no longer used for transportation be turned in for scrap. The WPB move was announced on Monday by Merrill Stubbs, chief of the Scrap Processors Branch.

Mr. Stubbs said that conversion to scrap is at a rate substantially in excess of the production rate in 1929, the best manufacturing year, when 4,587,400 passenger cars were produced.

"Scrap from autos during the past nine months," Mr. Stubbs said, "has been responsible for 10 to 15 per cent of the country's steel production."

Ohio Acts to Speed Wrecking of Automobiles

Cleveland

• • • To facilitate the transfer of title of graveyard automobiles and get them into the scrap piles the Ohio Bureau of Motor Vehicles recently issued a letter to county clerks stating that an affidavit, described in the letter, is to be accepted as evidence of ownership for the issuance of an Ohio certificate of title. With title issued, the then owner will assign ownership to the wrecker or junk man who will surrender the same to the Bureau for registration cancellation in the usual manner.

Scrap Drive Enriches USO

Buffalo

• • • Checks totaling \$46,403 representing net receipts from the sale of scrap metal donated during the Newspapers' United Scrap Metal Drive in Buffalo have been turned over to the USO and Army and Navy relief societies. Gross receipts were \$52,197, of which \$5500 was paid to the City of Buffalo for expenditures beyond normal costs.

NEWS OF INDUSTRY

Tooling Data Service Speeds War Program

Detroit

• • • Many problems of tooling for war work have been considerably smoothed for the past 10 months by the weekly reports of the Tooling Information Service of the Automotive Council for War Production at Detroit. Now this entire program is being materially expanded, embodying much more extensive information about available shop capacity for gage making, currently regarded as a continuing problem.

The Detroit Ordnance District office, the Army Air Forces Central Procurement District and the Detroit office of the Inspector of Naval Material have banded with the Automotive Council for War Production to enlarge this activity of the Tooling Information Service. The new plan will involve more war plants and more of the government field representatives in touch with the gage procurement program, through incorporation of information on additional types of gages and gage shops and through expansion of the mailing list to include more shops.

The Tooling Information Service of ACWP is a simple means of coordinating the needs of tool buyers and the availabilities of tooling equipment. Each Tuesday a facilities form (Fig. 1) is mailed to the participating shops, on which they can indicate when deliveries can be made on jigs and fixtures, gages, sheet metal dies, forging dies, cutting tools and other tools. Delivery promises are indicated in terms of three to six weeks, six to eight weeks, eight to 10 weeks, and over 10 weeks. This same blank also includes space to list available capacity on machines within the shop.

These reports are returned to the Tooling Information Service at Detroit as soon as possible, and data are transformed to summaries going to press late Friday. The following Tuesday the up-to-date reports carrying information as of the preceding Friday are mailed out.

Participating tool shops are mailed copies of the "Available Tooling Equipment Facilities Report," Fig. 2. Tool buyers receive copies of this report and also of the "Available Tooling Facilities Report," Fig. 3. (It is this latter report which is undergoing expansion by the Automotive Council in conjunction with the three branches of the armed services.) Equipment buyers receiving these reports can readily determine where their needs can be filled. Contact can then be made directly with the producing shop, or if desired, through the Tooling Information Service.

This service, a branch of the Automotive Council, is financed by that organization as a means of speeding up war work. There are

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TOOL REPORTS: Fig. 1 (above)—This report on available tooling facilities permits shops to show their open capacity for manufacture of gages, jigs and fixtures, cutting tools and dies, classified by what delivery date can be promised. Space is also provided for requests for assistance in obtaining sources for tools or placement of work on machines. Fig. 2 (at right)—This form on tooling equipment facilities goes to tool shops and equipment purchasers. The list is broken down into types of machine tools available for work along with their capacities; each machine is coded to the firm name and address, carried in another section.

AVAILABLE TOOLING EQUIPMENT FACILITIES		
(Available for use but not for sale)		
MISCELLANEOUS	Code No.	GRINDERS—Cont'd
Vertical Broach (3-Ton—24")	13	Centerless Grinders, straight and profile
8½" Slotter, 24" Table, 9" Stroke	15	81
#3 Double LaPointe Broach	83	Centerless up to 2½"
Heavy Duty Keyseater,		Straight Only (3 Grinders)
½" to 1¼" cap.	88	72
Autometric Jig Borer	11	6"x12" Reid Surface
Fodick Jig Borer 36"x18"	3	50-73
Jig Borer (.001" limit), 8"x16"x16"	28	Wells Cutter
P & W Jig Borer 12"x18"x16"	17	#15 Bridgeport Knele 110"
Jig Borer, 18"x24"x42"	31	24
2-ton Hyd. Straightening Press	87	#4 B & S Univ. Ext. 10"x30"
#31 Excello Thread Grinder	57	78
#4-A Fellows Gear Shaper	57	#4 B & S Univ. Ext. 14"x60"
Spiner ¾"x4"	25	40
250 Ton Coin Press	6	#70 Heald Internal
1200 Ton Hydraulic Press	33	21-48-51-65
Ext. Landis 10"x20"	53	Rotered Cutter (Universal)
Ext. Landis 10"x24"	74-53	59
O.D. Landis		Internal (4" Capacity)
		83
		LATHES
		10"x36" and 10"x30"
		18
		13" Seneca
		47
		15"x7" S.B. Taper Attachment
		52
		16" Engine
		77
		16"x30"
		50
		Garvin 1½"
		18" Prentiss
		54
		Gisholt (up to 6½" bar) (3)
		40

NEWS OF INDUSTRY

no charges to manufacturers or to listed shops for the service, and any shops wishing to participate are welcome to do so.

At present nearly 400 shops, including about 175 gage shops, supply information on their open capacity each week. Fifteen hundred users of gages receive weekly reports showing openings for additional work. The plans now made in conjunction with the armed services call for more than doubling the 400 reports being received and for expanding distribution over a considerably wider sphere. Originally designed for Michigan and north central area distribution, the reports are already being used in much more distant fields.

Before any shop is listed in these reports, the service files complete data on the establishment's equipment and its physical condition. Then when a tool buyer inquires about a firm unfamiliar to him, he can obtain a fairly complete picture of what he can expect to find by personal inspection, along with reference lists of companies with which the subject firm has previously done business.

The "Available Tooling Facilities" report not only shows the types of tool production in each plant and their delivery, but also classifies precision ratings of shops, namely plus or minus 0.001 in., plus or minus 0.0005 in., and plus or minus 0.0001 in.

Expansion of the gage listing facilities makes possible a more

detailed picture of availabilities. Hitherto, plug gages were classified only as such; now they are listed as plain plug and thread plug types. Thread, ring and flush pin type gages are added as separate classifications along with ring, snap, built-up fixture and spline gages.

Meanwhile, a cooperative study has just been undertaken between the armed services, the Automotive Council and plants which make and rebuild gages, studying the possibilities in reclaiming and salvaging work. This study is expected to result in a more thorough understanding of the possibility of putting gages back in service after they have been worn out, damaged or made obsolete by change of design of the product.

Inasmuch as most of the contacts for production resulting from the tooling facility reports are made directly between buyer and supplier, the Tooling Information Service does not have any semblance of a complete file on its results. But sufficient reports trickle in to its offices to give evidence of its efficacy.

For example, an Indiana company was unable to get into production on marine engines for small landing boats and barges due to inability to locate sources which could deliver small tap and thread gages within a 10 to 20 week period. By checking various sources, the Tooling Information Services found a tool shop that

had just completed a sizable order of the same type of equipment for another producer. Delivery quantity was sufficient on this order so that the tool shop could divert enough taps and gages to start the marine engine firm in Indiana on its job without hampering the output of the other company which had originally placed the order. These arrangements were completed and tools were on their way the following morning.

In another instance, a central New York firm used the service exclusively for all its tool requirements, including jigs, fixtures, gages and other tools, to produce an order for 0.50 cal. machine guns. Five tool firms in the Detroit area were located within three-quarters of an hour and had taken on the order over long distance telephone.

Naturally, all cases do not work out so happily for tool purchasers. There are bottlenecks and they cannot be avoided. But the intimate knowledge provided concerning facilities around Detroit has served to speed innumerable production problems toward solution.

The service has proved of value to small tool shops and large ones alike. In recent weeks the first report made to the service by a small Detroit shop listed open one 9-in. and two 12-in. lathes. When next the reporting blank was mailed to this shop, it was returned to the service with this statement scrawled across it: "No unfilled capacity now—thanks to you."

GOES TO BUYERS: Fig. 3 (below)—The available tooling facilities report goes each week to tool buyers in 1500 companies producing war work. Each shop reporting is listed as to facilities for doing tooling work, with delivery promises and the precision standards possible in the shop.

AVAILABLE TOOLING FACILITIES Report No. 38 — November 16		JIGS AND FIXTURES			GAGES			CUTTING TOOLS			SHEET METAL DIES		FORGING DIES								
		Large	Medium	Small	Plug	Ring	Snap	Built Up Fix.	Spine	Flush Pin	Thread Plug	Thread Ring	Flat Form	Dovetail Form	Circular Form	Milling Form	Back Off	Plain	Spiral	Large	Medium	Small
Precision rating of shops are designated thus:		Code figures indicate delivery promises given to us by companies listed:—																			
* ±.001" Limits ** ±.0005" Limits		◆ 3 to 6 weeks ★ 8 to 10 weeks																			
*** ±.0001" Limits		■ 6 to 8 weeks ● over 10 weeks																			
(MICHIGAN)																					
*** Ace Tool & Die Co., 2842 West Grand Blvd., Detroit.		A. H. Pearson TR. 1-4400																			
*** Active Tool & Mfg. Co., 888 Clairpointe Ave., Detroit.		L. A. VanTassel LE. 6547																			
*** Aero Tool Co., 2963 Heidelberg St., Detroit.		R. Pegg FL. 3110																			
*** Aircraft Tool & Mfg. Co., 3541 Vinewood Ave., Detroit.		J. P. McCarthy LA. 5020																			
*** Alcoy Die & Machine Co., 12863 Alcoy Ave., Detroit.		L. J. Gudotta PI. 4718																			
*** American Tool & Die Works, 814 Ada St., Kalamazoo.		David R. Satin																			
*** American Cutter & Eng. Corp., 31739 Mound Rd., Warren.		W. C. Bauer																			
*** Amco Gage Co., 19760 W. Eight Mile Rd., Detroit.		F. A. Gray RE. 7640																			
*** A. M. Tool & Die Works, 14115 Woodrow Wilson Ave., Detroit.		E. T. Kidd TO. 8-0676																			
* Apex Metal Specialties, Inc., 28829 Orchard Lake Road, Farmington.		W. C. Johnson																			
*** Argo Tool & Eng. Co., 13819 Mt. Elliott Ave., Detroit.		Wm. Gardner TW. 1-0440																			
*** Arrow Metal Products Co., 9325 E. Forest Ave., Detroit.		A. Schneider PL. 2780 (See Note 6)																			
*** Artisan Tool & Cutter Co., 1915 Burdette Ave., Ferndale.		M. Miller EL. 6146																			
*** Auto Tool & Die Co., 11635 French Rd., Detroit.		A. L. Berg (See Note 8)																			
*** C. Verner Co., 1515 Springwells Av.		A. L. Berg (See Note 8)																			

PERSONALS

• **Wilson H. Moriarty** has been promoted to assistant to president of the National Malleable & Steel Castings Co., Cleveland, and **Walton L. Woody**, has been named assistant to president, in charge of the Sharon, Pa., and Melrose Park, Ill., steel castings plants. Both have long-term records with National Malleable, Mr. Woody joining the company 28 years ago and Mr. Moriarty 23 years ago. After a training period, Mr. Moriarty became resident inspector at the Cleveland plant and later held similar positions in the East St. Louis and Chicago plants. In 1927 he was appointed chief inspector for all of the company's plants. Three years later he was made sales engineer at the Cleveland plant, and in 1939 became that plant's sales manager. In June, 1942, he was again promoted, this time to the position of assistant to the first vice-president. Mr. Woody joined National Malleable's Indianapolis plant in 1914. In the same year he was transferred to Cleveland and established the company's first chemical laboratory. He later became metallurgist and assistant superintendent in Cleveland, and in 1925 was made plant manager. In 1926 he acted as manager of the Chicago plant, but returned to Cleveland later the same year and remained until 1938, when he was made plant manager at Sharon, Pa., his present headquarters.

• **Karl F. Smith** has been named to the research staff of Battelle Memorial Institute, Columbus, Ohio, and has been assigned to its division of industrial physics.

• **Philip M. Morgan**, president of the Morgan Construction Co., Worcester, Mass., and **David G. Baird**, vice-president of Marsh & McLennan, New York, have been elected members of the board of the Wickwire Spencer Steel Co., New York.

• **Eugene Bouton**, formerly with the J. I. Case Co., Racine, Wis., and more recently chief engineer in the WPB headquarters at Milwaukee, has been appointed automotive specialist for the WPB in Wisconsin.

• **W. E. Curran**, formerly assistant plant manager of Rheem Mfg. Co.'s plant at Birmingham, has



WILSON H. MORIARTY, assistant to the president, and **WALTON L. WOODY**, assistant to president in charge of the Sharon and Melrose Park steel castings plants of the National Malleable & Steel Castings Co., Cleveland.

been promoted to plant manager at Birmingham. **W. C. Heaslip**, heretofore associated with the General Railway Signal Co., Rochester, N. Y., has been appointed Birmingham plant superintendent for the company, and **L. S. Day**, formerly connected with the Birmingham Ordnance District, has been named engineer.

• **R. D. Cortelyou**, northern California warehouse price authority, has been appointed consultant to the Steel Recovery Unit of the WPB Iron & Steel Branch, with offices in Pittsburgh. Mr. Cortelyou has recently undertaken special studies of supply and distribution problems of California warehouses.

• **George D. Gilbert** has been appointed general manager of Baldwin-Duckworth, Springfield and Worcester, Mass., a division of the Chain Belt Co. **William H. Gates** has been named manager.

• **Ellsworth L. Mills**, vice-president of Bastian-Blessing Co., Chicago, has been chosen president; Philip Kearny, of the International Acetylene Association, treasurer. Other officers elected are: **Glenn O. Carter**, vice-president; **Herbert F. Reinhard**, secretary. Mr. Carter is a consulting engineer with Linde Air Products Co. and a member of the executive board of the Compressed Gas Manufacturers' Association. Mr. Reinhard, who will serve as secretary for the 11th time, is associated with Union Carbide & Carbon

Corp., New York, while Mr. Kearny, who has previously served as a director, vice-president, and president of the association, is president of the K-G Welding & Cutting Co., New York. Directors for the coming year are **Henry Booth**, vice-president, Shawinigan Products Corp., New York; **E. L. Mathy**, vice-president, Victor Equipment Co., San Francisco, and **R. B. Swope**, president, Southern Oxygen Co., Inc., Arlington, Va. Members of the executive committee of the association for next year are: **H. S. Smith**, Union Carbide & Carbon Corp.; **C. D'W. Gibson**, vice-president (sales) Air Reduction Co., Inc., and Mr. Kearny.

• **A. F. Waltz**, president of Advance Pressure Castings, Inc., Brooklyn, has been elected president of the American Die Casting Institute, Inc. **H. H. Weiss**, president of the Superior Die Casting Co., Cleveland, has been named vice-president.

• **Arthur A. Turton** has been appointed chief engineer of the Harvill Corp., Los Angeles. Mr. Turton has been with the Harvill organization for nearly a year in charge of research and development as a consulting engineer. In the aviation industry, he has formerly been associated with Boeing & Beech at Wichita, Curtiss-Wright, North American Aviation, Lockheed Aircraft & Aircraft Accessories where his duties encompassed all phases of aircraft en-

gineering including controls, equipment and hydraulic design.

• **J. F. Gibson** has been made superintendent of the new branch plant at La Salle, Ill., of the B. F. Sturtevant Co., Boston.

• **John A. Kienle**, vice-president-director of sales, Mathieson Alkali Works, Inc., New York, has retired. Mr. Kienle joined the Mathieson Alkali Works as manager of sales in 1920, and was elected vice-president-director of sales in 1922. He has been succeeded by **Esse E. Routh**. Mr. Routh has spent his entire business career with the Mathieson Alkali Works, Inc., spending the early years of his business life at the Saltville, Va., Works, serving as Southern sales manager from 1920 to 1928 and general manager of sales from 1928 to date. **Robert J. Quinn** has been named assistant to the vice-president-director of sales. Joined the Mathieson Alkali Works, Inc., in 1920 as Western district sales manager in Chicago, he became assistant general manager of sales in the New York executive office in 1923. **D. W. Drummond** has been appointed general manager of sales.

• **Cecil W. Guyatt**, formerly assistant chief industrial engineer of the American Steel & Wire Co., has been named chief industrial engineer. **John S. Conant** has been made priorities administrator, at the same time continuing as general supervisor of production planning. **Lloyd W. Hackley**, formerly supervisor of production planning in the cold rolled department at the Cuyahoga Works in Cleveland, has been appointed assistant general supervisor of production planning for the entire company.

• **Thomas J. Mulvey** has been named production manager of General Electric's River Works at Lynn, Mass. In June, 1906, he entered the employ of the General Electric at its Schenectady plant as a clerk in the production department the day after he was graduated from high school. Since March 1, 1935, Mr. Mulvey has been a member of the manufacturing general department at Schenectady, as a member of the staff of G-E vice-president W. R. Burrows. In January, 1937, Mr. Mulvey was transferred to the Erie, Pa., plant as production manager, holding that position until his new appointment.

OBITUARY . . .

• **Douglas E. Price** died Nov. 18 of pneumonia at his home in Claridon, Ohio. He was 42 years old. Mr. Price worked for the Koppers Co. of Pittsburgh for 22 years. He was contract manager of the Tar & Chemical Division when he retired in 1939 because of ill health.

• **Elmer H. Fathauer**, sales agent in St. Louis for the National Malleable & Steel Castings Co., died of heart disease at Decatur, Ill. He was 47 years old.

• **Bennet B. Bristol**, who with his brother Edgar H. Bristol founded the Industrial Instrument Co., in 1908, which later became the Foxboro Co., died Nov. 10. He was 74 years old. Throughout the history of Foxboro, he served as its treasurer and clerk.

• **George C. Jessop**, general superintendent in a war division of the Chevrolet Motor Division of General Motors Corp., died at Flint, Mich., aged 56 years. He was an automobile industry veteran, having been a test driver on endurance runs during the early days of the industry.

• **William Kirk Bradley**, Chicago manager of Detroit Brass & Malleable Works, died recently, aged 54 years.

• **Virgil Oldberg**, of Vickers Mfg. Co., Detroit, died at the age of 64 years. Mr. Oldberg was former president of the Oldberg Mfg. Co. and at one time was service manager for Hudson Motor Car Co.

• **Edward C. Baynes**, retired producer of automotive parts and the inventor of several compression devices used in the automobile industry, died in Detroit.

• **Presly Neville Guthrie, Jr.**, associated with Allied Metal Products & Supplies Corp., New York, died recently. He became vice-president of Reading Iron Co. in 1928 and president in 1930, resigning his office in 1938.

• **William A. Hendley**, president of the Hendley & Whittemore Co., Beloit, Wis., died recently after a brief illness. He was 73 years old.

• **Harlow Bradley**, supervisor of foreign dealers for the Allis-Chalmers Mfg. Co., Milwaukee, died Nov. 15 after a two months' illness. He had been with the firm

since 1915 and in 1920 took charge of the Paris office. He became European manager for the tractor division in 1929, returning to Milwaukee in 1936. He was appointed to his recent position in 1941.

• **Arthur E. Smith**, assistant superintendent of the Fairfield Wire Works of the Tennessee Coal, Iron & Railroad Co., from 1914 to 1937, when he retired, died Nov. 16 at his home in Birmingham, aged 71 years. Mr. Smith went to Birmingham from Worcester, Mass., where he was assistant superintendent at the Worcester plant of the American Steel & Wire Co.

• **Horace H. Galbraith**, resident manager of sales, Jones & Laughlin Steel Corp.'s Denver office, died Nov. 19. Mr. Galbraith was with Jones & Laughlin since 1919 and prior to that time had worked for the Colorado Fuel & Iron Co. and Scully Steel Products Co.

• **Lawrence A. Sorensen**, manager of the American Brass Co., in Buffalo, died at his home in Kenmore, N. Y., Nov. 24, aged 52 years. Mr. Sorensen went to work for American Brass as an office boy in 1905 and later was sent to Ansonia, Conn., as a clerk. Returning from Army service in France in 1919, he was assigned to Buffalo as a clerk, promoted to assistant manager, and made manager in 1934.

• **Robert H. Watson**, consulting metallurgist for the Hanna Furnace Corp., died suddenly Nov. 21, at Syracuse, N. Y. Mr. Watson went to Detroit 25 years ago and was in charge of first operations of the Hanna blast furnaces on Zug Island. He was consulting metallurgist for the Semet-Solvay Co. for a number of years.

• **Charles B. Harris**, credit manager and assistant secretary of J. H. Williams & Co., Buffalo, drop forge manufacturers, died in his office Nov. 25. Starting with the company when it was in Brooklyn, he had completed nearly 37 years of service. He was 61 years old.

• **George H. Hunt**, Detroit manufacturer's agent, died recently. Mr. Hunt retired two years ago after having been associated with plate glass and hardware firms.

• **Julius H. Mueller**, treasurer and director of the Lombard Governor Corp., Ashland, Mass., died at his home in Framingham, Mass., Nov. 23. He was 62 years old.

The Iron Age Critical Tool Locating Chart

Compiled from latest WPB data on available machine tool capacity.

CRITICAL TOOLS	REGIONAL OFFICES—WAR PRODUCTION BOARD											
	Total	No. 1 Boston	No. 2 New York	No. 3 Philadelphia	No. 4 Atlanta	No. 5 Cleveland	No. 6 Chicago	No. 7 Kansas City	No. 8 Dallas	No. 10 San Francisco	No. 11 Detroit	No. 12 Minneapolis
BORING												
Horizontal—3" Bar	49,856	6,878	8,590	6,024		10,513	7,014	1,532	1,778	2,544	4,241	742
" —To 4" Bar and Over	63,484	5,873	6,752	10,280		18,931	6,827	3,655	2,113	3,694	4,039	1,320
Vertical—54"	40,212	4,105	6,617	5,579		8,447	4,696	4,526	1,345	680	1,770	2,447
" —To 84"	55,786	4,197	6,251	9,295		14,198	5,174	4,117	3,706	5,089	2,137	1,624
" —To 120"	18,994	1,971	2,723	2,567		5,579	2,170	1,481	412	881	750	460
" —Over 120"	5,311		966	1,206		1,673	795	348	37		120	168
Jig Borers	34,054	7,650	6,136	2,876		5,250	4,605	975	318	2,349	3,626	269
Misc. Precision—Hedde—Ex-Cell-O type	21,285	1,663	1,073	1,368		7,792	3,811	1,561	220	2,611	958	223
BROACHING	81,469	15,397	10,867	6,064		16,797	13,297	3,486	934	3,539	8,830	2,158
DRILLING												
Radial 6' to 8' Radius	71,247	6,857	8,486	11,181		21,105	7,901	5,103	3,530	1,826	3,732	1,526
Over 8' Radius	4,576	138	394	1,186		292	96	456	1,818	64	72	60
DUPLICATING AND PROFILING	35,562	12,098	9,312	3,619		3,668	2,537	383		1,400	2,407	138
FORGING												
Drop Hammer—Board 100 lb. up	134,299	41,455	33,598	10,099		22,316	10,412	1,179	986	3,089	10,176	992
Steam 5000 lb. up	18,791	2,670	1,135	1,546		4,806	758		294	172	6,342	1,068
Press—Forging—Steam Hydr. 500 ton	7,540	1,124	1,626	48		2,585	1,625	216		68	248	
GEAR CUTTING												
Gear Hobbers—48" and up	25,571	2,616	1,809	3,260		7,001	2,874	1,983	1,237	1,306	2,877	608
Bevel Gear Cutters	53,625	11,340	5,338	7,562		13,831	7,085	1,864	792	1,939	3,270	604
GRINDERS												
Centerless	37,120	8,489	3,250	3,566		6,879	4,439	2,503	172	2,679	5,593	
External Cyl.	426,770	102,346	73,519	39,666		62,573	48,901	24,366	5,271	19,222	36,249	14,657
Internal Cyl.	146,694	28,867	16,470	13,131		22,848	19,158	11,831	5,144	11,185	13,747	4,313
Thread	5,380	887	894	813		632	242		168	812	932	
LATHES												
Engine—24" Dia.—Over 60" c.c.	231,069	34,860	36,744	30,140		48,238	23,943	15,109	16,169	10,525	6,931	8,410
" —Over 24" Dia.—To 60" c.c.	86,040	14,023	16,567	9,534		14,940	10,867	8,659	2,284	3,171	3,321	2,974
" —Over 24" Dia.—To 96" c.c.	144,018	18,731	23,829	15,049		31,655	12,934	16,048	8,517	8,932	4,992	3,31
" —Over 24" Dia.—Over 96" c.c.	360,569	50,411	45,830	56,980		73,468	28,178	34,020	28,097	22,196	13,080	8,289
Turret—12" Dia. 2½" Bar and up	102,958	16,533	25,073	13,360		19,880	10,306	4,924	1,759	1,660	6,751	2,712
" —To 24" Dia. 2½" Bar and up	181,903	24,102	25,594	23,134		34,912	19,251	14,666	8,354	14,823	10,411	8,856
" —Over 24" Dia. 2½" Bar and up	42,430	3,146	4,832	5,973		8,407	6,066	4,005	3,096	4,637	1,194	1,074
Automatic—12" Diameter	17,380	2,461	2,048	664		851	6,463	1,138	336	780	2,530	109
" —To 24" Diameter	17,313	2,057	1,916	226		1,731	1,541	402		4,243	4,136	1,061
" —Over 24" Diameter	2,405		498	218		168	1,473		50			
SCREW MACHINES												
Automatic—Single 1"	79,390	15,100	27,593	8,593		10,697	10,320	2,151	438	534	3,162	802
" —Single to 3"	75,088	12,951	11,123	8,922		15,126	15,335	3,622	648	3,591	3,242	826
" —Single—Over 3"	18,418	2,379	2,036	2,706		2,994	6,579	24	108	796	718	78
" —Multiple—To ½"	5,690	684	617	600		582	312			2,895		
" —Multiple—To 1"	103,110	19,777	16,166	11,331		17,327	18,060	3,853		2,149	13,643	804
" —Multiple—To 3"	74,749	11,639	8,488	9,818		16,538	13,125	4,019		2,926	7,148	1,039
" —Multiple—Over 3"	2,795	143	120	116		996	458			694	268	
MILLING												
Standard Type—Horizontal—No. 3	244,246	45,381	44,372	22,300		43,657	31,069	14,665	7,686	11,624	18,005	7,487
" —Horizontal—Over No. 3	116,156	14,583	19,339	18,312		24,177	9,555	6,905	3,850	8,962	7,271	3,202
" —Vertical—No. 3	49,587	13,150	7,372	3,166		8,083	5,840	1,356	484	2,213	7,448	475
" —Vertical—Over No. 3	48,501	13,439	3,987	7,538		9,722	4,871	1,231	450	1,924	4,519	820
Mfg.—Horizontal—12" table width	32,427	10,798	7,030	1,421		4,079	5,409	808	120	916	1,076	770
" —Horizontal—Over 12" table width	19,486	2,894	2,074	913		5,488	4,823	756		1,029	1,004	505
Planer—Over 30" table width—slab mill	8,908	2,466	1,728	786		2,132	234	496			456	612
" —Over 30" table width—side and spdl.	2,907	512	158	919		185	231	144	128	368		264
" —Over 30" table width—vert. and spdl.	6,973	1,597	1,517	1,004		1,181	392		148		520	614
" —Over 30" table width—side and vert.	9,045	1,731	1,164	947		2,213	1,456	192		192	949	201
Misc. and Dia. Cutting—Heller Type	22,174	6,447	6,529	1,410		4,442	1,176	308		1,114	748	
PLANERS												
60" wide to 15'	11,889	656	1,563	2,229		2,981	1,796	1,094	744	316	230	280
60" wide, over 15'	5,578	764	637	880		1,149	767	542	272	169	230	168
Over 60" wide to 15'	3,637	418	568	1,054		754	168	202	37	96	144	196
Over 60" wide, over 15'	8,039	1,012	1,392	1,724		2,792	304	270		145	72	328
THREADERS												
External Mills	31,138	7,016	3,548	3,339		4,203	3,067	1,180	928	4,049	2,545	1,263
Internal Mills	3,689	177	209	417		1,194	1,140	216	336			
TOTAL AVAILABLE HOURS	3,507,320	618,659	558,165	406,687		674,656	411,926	214,128	115,264	179,074	240,181	88,600

The available critical tool hours per week here shown are based on an 168-hour week and represent usable tool hours subject to operating labor available. Reports are based on initial inspection of the plants concerned by engineers trained for this work. The War Production Board Field Offices are acting as clearing houses for all public or private contractors or agencies interested in using these facilities.

When making inquiries regarding the availability of these critical tool hours for specific jobs, communicate in detail with the Regional Supervisor, Critical Tools Service, in the WPB Region best located for your job. They are:

Region	Supervisor	Assistant	WPB Office
No. 1 Boston	R. F. Wood	H. H. Whitecomb	17 Court Street
No. 2 New York	J. J. Carroll	C. Philippi	122 E. 42nd Street
No. 3 Philadelphia	C. E. Reinicker	R. V. Hilands	1617 Penn. Blvd.
No. 5 Cleveland	C. J. Perrier	C. R. Griffith	Union Commerce Bldg.
No. 6 Chicago	S. C. Bloom	W. I. Buhl	20 N. Wacker Dr.
No. 7 Kansas City	W. A. Crooks	P. J. Leonard	Mutual Interstate Bldg.
No. 8 Dallas	B. P. Rhineford	W. E. White	4th Fl., Fidelity Bldg.
No. 10 San Francisco	M. Brookman	S. W. Lifschitz	1355 Market St.
No. 11 Detroit	R. O. Cunningham	J. B. Shepard	7310 Woodward Avenue
No. 12 Minneapolis	E. H. Pitney		326 Midland Bk. Bldg.

MACHINE TOOLS

. . . Sales, Inquiries and Market News

Tangeman New Head Of Machine Tool Builders Association

• • • Walter W. Tangeman, vice-president of the Cincinnati Milling Machine Co., Cincinnati, who in October was elected first vice-



Walter W. Tangeman

president of the National Machine Tool Builders Association at its annual meeting in New York, has been advanced to the presidency upon the resignation of John S. Chafee. Mr. Chafee resigned as newly elected president of the association to become deputy administrator of the Tools Division of the War Production Board under George H. Johnson. Mr. Chafee also resigned as vice-president of Brown & Sharpe Mfg. Co., Providence.

More Gasoline Sought

Cincinnati

• • • Personnel departments of district machine tool plants have been working day and night dur-

ing the past week in an effort to get proper additional rationing of gasoline so that employees will have sufficient means of transportation to and from the plants. While some complaints are heard here and there, the rationing offices' attitude toward allowance of additional rationing for men engaged in the industry has been by and large fair and in some cases almost liberal. Thus the anticipated difficulties have more or less disappeared in the actual experience during the present week. This, of course, does not mean that the complete freedom of transportation in their own cars has been accorded to machine tool employees, but they have been allowed reasonable rations, so that anticipated losses in production because of the failure to get to work have almost disappeared.

Confusion, however, now appears over the recent wage freezing order and many plants are busy rechecking and straightening their wage program to make sure that they are within the terms of the wage stabilization order. Of course, Washington has not yet clearly defined various important phases with reference to bonus and what exactly is definite wage schedule or plan, so many of the plants are seeking clarification of the order. So far as business and production is concerned, there is no change.

Cancellations Increasing

Cleveland

• • • Cancellations of orders for machine tools continue to roll in to dealers and builders in volumes unprecedented since the entry of this country into the war. The shift of emphasis in production to aircraft apparently is having its effect on the setting up for production of other materiel, where either the manufacturers are easing off pressure on builders for more equipment or their contracts are being canceled or held up by the purchasing agencies.

While the cancellations for these tools are steadily coming in, there has not as yet been any concentrated buying by either air-

craft manufacturers or their subcontractors. Consequently, it may be considered that any cancellations of orders for machine tools is helping wipe out the industry's nine month backlog of orders.

Evidence of the fact that there has been at least a temporary let-up on machine tool purchases is the announcement by one large manufacturer of planers of a new delivery schedule.

The situation on planers has been rather acute during the past six months, and the indication that builders are again promising deliveries within six or seven months means that they are quickly catching up. This may be the result of rather wide use of subcontracting some of this work. Many large companies not in the machine tool industry have been building certain types of planers for some manufacturers of this equipment.

DPC Contract Awards

• • • Defense Plant Corp. has recently placed the following contracts for emergency construction necessary to the war effort:

Bechtel-McCone-Parsons Corp., Los Angeles, to provide for construction and equipment of plant in Alabama at cost estimated to be in excess of \$12,500,000.

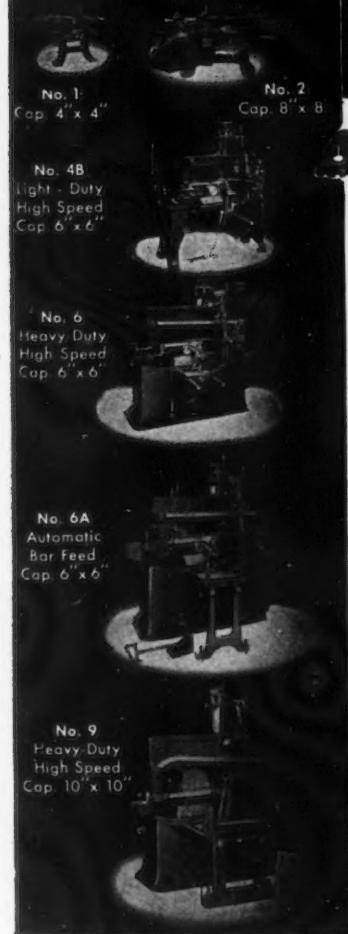
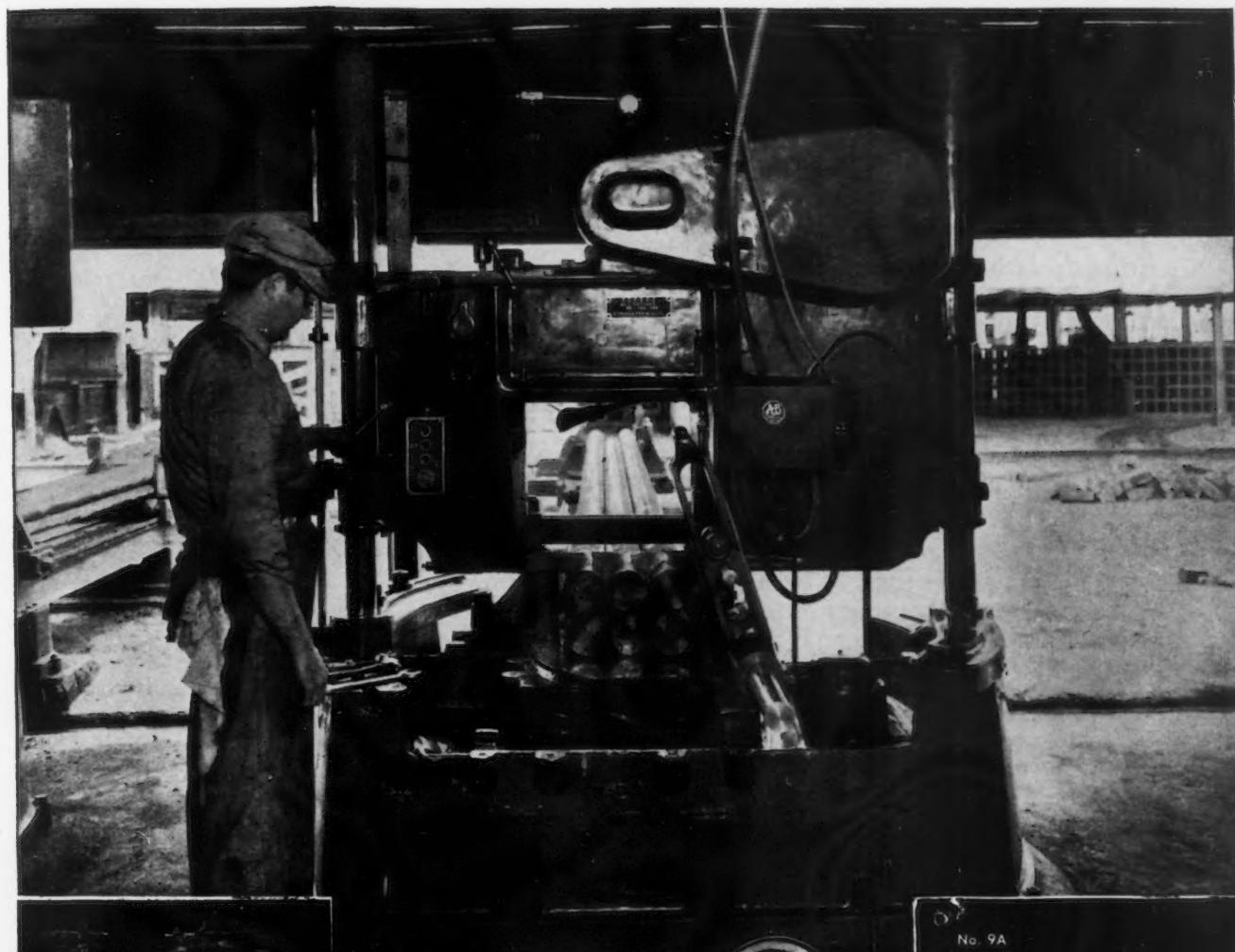
Hirsch Distilling Co., Loretto, Ky., to provide equipment in Kentucky.

Simpson Electric Co., Chicago, to provide plant facilities in Illinois.

Sun Oil Co., Philadelphia, to provide for construction and equipment in Ohio, at a cost in excess of \$3,000,000.

General Motors Corp., Detroit, to provide for additional plant facilities in Ohio at a cost in excess of \$1,400,000, making a total commitment of more than \$13,000,000.

General Motors Corp., Detroit, for additional plant facilities in New Jersey at a cost in excess of \$200,000, making a total commitment of more than \$6,000,000.



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Cut anything that will go between the jaws

This is one of five No. 18 MARVEL Giant Hydraulic Hack Saws used by a well known Texas tool company to cut-off "multiple bars of alloy steel in round, square, and flat shapes, up to the maximum capacity of the large work-throat (18" x 18")".

These super hack saws are designed for the largest sizes, and toughest steels—up to 18" x 18". After a year's heavy duty service, when asked as to the effectiveness of these saws in solving the cutting-off problems at this plant, the mechanical engineer in charge reported them "very effective."

ARMSTRONG-BLUM MFG. CO.

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Chicago, U. S. A. 225 Lafayette St., New York



NON-FERROUS METALS

. . . Market Activities and Price Trends

Zinc and Lead Bonuses Raised; Labor Shorter

• • • Lead and zinc producers' premiums were raised last week by Metals Reserve Co. The old premium for over-quota production of zinc, \$28.05 a ton, has been raised to \$29.70. Adding prevailing market prices, MRC will now pay a total of \$84.98 a ton for over-quota output, compared with \$83.33 previously.

The lead premium was raised from \$39.60 a ton to \$41.80, bringing the total price to \$118 a ton.

Producers are still dissatisfied with the quota figures set, most of them contending they should be revised downward. Revisions have been promised companies affected by wage increases. In addition, zinc producers were last week told to get out all the ore possible and then take up the subject of quota revisions with OPA.

Manpower shortages at the copper, zinc and lead mines, which became acute in the summer and then were somewhat mended, are again becoming worse instead of better. Fowler V. Harper, deputy director of the War Manpower Commission, reported that the commission has been unable to recruit needed new workers in sufficient numbers. The War Department, which a few weeks ago furloughed 4000 miner soldiers, after great fanfare, has announced that it will be unable to furlough any more. Those already furloughed were to have stayed on in the mines indefinitely if they survived a 90-day trial, but now the War Department reports that it hopes to return them all to active duty soon.

WMC's labor management committee has recommended the importation of 10,000 Mexican workers, 5000 of whom are esti-

mated to be needed in the copper mines, and the commission is reported ready to ask the State Department to arrange for bringing in surplus workers from Mexico's non-ferrous mines.

Aluminum Case Is Left Hanging in Supreme Court

• • • The Justice Department's anti-trust suit against the Aluminum Co. of America has been pigeon-holed by the Supreme Court because four of the nine justices have disqualified themselves from passing judgment and a quorum of six justices is required. Justices Murphy, Jackson and Reed were members of the Justice Department while the case was pending there. Chief Justice Stone also declared himself ineligible, for an undisclosed reason.

The case has not been dismissed, and it will remain on the docket indefinitely, pending action. Meanwhile, the decision of the Federal District Court of New York, in favor of the Aluminum Co., will remain in effect.

The District Court handed down its decision after a 26-month trial, the longest in history. The opinion, which took 10 days to deliver, held the Justice Department had not proved its charges that the company had violated the Sherman Act by monopolizing the production and sale of aluminum.

Zinc Covered Pennies Planned

• • • The copper in the penny will soon follow the nickel in the nickel. As soon as a substitute coinage bill pending before Congress is passed, the Treasury will recommend that one-cent pieces be minted of steel coated with zinc.

Price Rises Permitted Because of Silver Costs

• • • Two price increases because of silver costs have been permitted by OPA. Sellers of rolled gold plate or gold filled stock, who formerly used imported silver which has since been channeled into war

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NON-FERROUS METALS



FROM CABLE TO PIGS: Miles of underground wire once used to carry electricity at a General Electric plant are being salvaged. As this picture shows, the cable is fed to a fire, and the molten lead sheathing allowed to run into molds. The copper cable remaining is baled, and both pigs and bundles are shipped to mills for refining.

production, and who are now using newly-mined domestic silver, were allowed to adjust their prices to meet this cost. Domestic silver is 71.11c. an oz.; foreign silver is 45c. now and until August was 35c. Makers of machines and parts containing silver may also pass on their increased silver costs.

Gilding metal scrap has been exempt from price control, an order that means little since the two products obtained from it, steel and copper, are under control.

Substation Saves Copper Cable

• • • More than 51,000 ft. of large-size copper cable was saved by a recent installation of one 1500-kva unit substation at an eastern war plant, General Electric reports. For the best spotload distribution in the area, thirty-three 500,000 cm. cables for six feeders would have been required from the power station to the load area, a distance of 1700 ft. Installation of a substation at the load center required

only 5100 ft. of cable, a saving of nine miles.

The monthly average prices of the major non-ferrous metals during November were, in reality, the OPA ceiling prices set on those metals. These prices are as follows:

	Cents per lb.
Electrolytic Copper, Connecticut Valley	12.00
Lake Copper, Eastern Delivery	12.00
Straits Tin, Spot, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65
Lead, St. Louis	6.35
Lead, New York	6.50

Buffalo Detinning Up in Air

Buffalo

• • • Buffalo's projected detinning plant has become a Finnegan—on again, off again. After the DPC had taken an option to buy 12 acres of city-owned land for the plant, the city was advised a few days later that the proposal had been abandoned and the option would not be taken up.

Mexico's Tiny Tin Output, \$1.25 lb., Used for Tubes

• • • The Mexican tin industry is reported to be producing pure tin tubes for tooth paste and shaving cream, and to be soliciting orders from American pharmaceutical companies which have a Latin American trade. Because of the high prices it commands at home, said to be \$1.25 to \$1.50 a lb., the tin is not coming to this country. Production is not large, probably 800 tons a year. The highest previous production was in 1931 when 763 tons were produced, of which 751 were exported.

Copper Allocations

• • • Ordnance plants were allocated more copper than usual for December and wire mills received a smaller proportion than usual. The allocations, which began coming through on Nov. 23, were out earlier than ever before.

*Spring*s are not metal alone —

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- COMPETENT ENGINEERING
- LABORATORY Controlled Materials
- SCIENTIFIC PRODUCTION Methods
- MODERN FACILITIES
- PROPER HEAT TREATMENT
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TWO PLANTS FOR SPRING SERVICE
DETROIT and ANN ARBOR MICHIGAN

B-G-R PRODUCTS SERVE OUR COUNTRY ON LAND, AT SEA, AND IN THE AIR

Use of Salvage Drive Material Disputed

Wolcott Defends Mills Against Charges

• • • Scrap collected in the recently concluded salvage drives is being consumed by steel mills as rapidly as conditions permit, R. W. Wolcott, chairman of the American Industries Salvage Committee and president of Lukens Steel Co., said Nov. 28, in reply to charges that steel mills had virtually ceased to purchase the grades of scrap accumulated during the scrap drive.

"During the scrap drive," Mr. Wolcott said, "it was clearly stated that the problem was to collect the scrap before winter weather would make scrap collections difficult if not impossible. The immediate use of all scrap thus collected was neither contemplated nor possible.

"The household scrap as yet unconsumed represents what might be called a blood bank. Steel mills can draw upon it—and are consistently doing so—to augment the available flow of higher grade scrap.

"Because of its heterogeneous character, however, household scrap cannot be used to make steel for ordnance, armor, or any other steels which must be produced to exacting specification. Even in making ordinary steels, household scrap must be used with extreme caution.

For these reasons, household scrap must be very carefully prepared.

Scrap dealers have strongly maintained the position that the sorting and grading of scrap is their own function. They have always objected to steel plants installing the necessary equipment to perform these operations themselves. Consequently, today the great majority of steel plants are not equipped to receive shipments direct from the salvage piles.

"In view of the apparent inability of the scrap yards to sort and grade the large tonnages of miscellaneous scrap now coming out, I in-

tend to suggest to the scrap committee of the steel industry at an early meeting that they investigate the possibility of equipping themselves for sorting, cutting up and grading scrap to help relieve what seems to be a bottleneck.

"Although some carloads of household scrap shipped to steel plants have had to be rejected, the number of rejections has not been excessive. The rejections have been caused mainly, if not entirely, because the scrap was not adequately prepared in accordance with government regulations. To have accepted ill-prepared scrap would have exposed the steel plants to public censure by the government, and possible court action.

"Furthermore, in a few instances, steel plants have contracted with dealers to accept quantities of household scrap, only to receive word from WPB that they had been allocated enough scrap for their current needs, sometimes from the same dealers with whom the orders for household scrap had been placed.

"Under those circumstances, cancellation of the contracts for household scrap to the extent of the duplication caused by the allocations have necessarily followed.

"I have found no disposition on the part of steel companies in the East or elsewhere in the country to refuse to purchase and use household scrap as rapidly as conditions permit.

"As a steel maker producing large tonnages of plates for the Navy and other war uses, I want to express my deepest appreciation for the great amount of scrap contributed by householders all over the country in response to the appeal by the steel industry.

"This scrap is now serving the war effort in the best possible way—as a blood bank from which transfusions can be made as required to maintain our production of essential war materials."

Public Scrap Shunned, Barringer Asserts

Washington

• • • Steel mills which a few weeks ago were urging the public to donate scrap to the various salvage drives are now, in many instances, so comfortable in regard to supplies that they have become extremely choosy, with the result that scrap dealers may be left holding the bag, E. C. Barringer, president and executive secretary of the Institute of Scrap Iron & Steel, Inc., said Nov. 27.

A leading steel mill of Eastern Pennsylvania has cancelled some contracts for scrap with New York, New Jersey and New England dealers, he said. Other mills in this area have suspended all shipments or have refused offers of tonnage or are taking advantage of technicalities in the OPA schedule to reject the kind of materials they were

Statements Being Probed, Bureaus Say

Washington

• • • Statements concerning the inventory situation in scrap dealer yards are being investigated by the Government, it was stated last Saturday by Lessing J. Rosenwald, director of the conservation division and H. G. Batcheller, director of the WPB steel division.

In the meantime, they added, the urgency for iron and steel scrap and the difficulties of collecting it will be increasing and the whole-hearted cooperation which has been accorded the Government by the people in scrap collection, must be continued. Government stockpiles will be established if the time ever comes when scrap dealers cannot handle the flow of salvaged materials to the mills, it was said. These stockpiles would be "insurance" against any scrap shortage which might develop.

SCRAP

freely accepting a month ago, according to Barringer.

In small towns in the Middle West, notably Indiana and Ohio, dealers have been penalized \$2.50 per ton because they have been attempting to market the lighter grades of salvage drive scrap with their heavier materials, the alternative being to hold drive scrap in their yards indefinitely, he said. Similar penalties have been imposed by some consumers upon scrap bundlers because the latter, short of labor, have not been able to hand pick drive scrap, he asserted.

"The net effect of these policies by certain steel mills and blast furnaces, as they feel more secure, is to discriminate against salvage drive scrap which the public generously donated," said Mr. Barringer. "Dealers realize that drive scrap is light and inferior and that steel mills must use it in small proportions with the preferred heavy grades, but the non-cooperative attitude of these consumers is in sharp contrast to the spirit manifested by the public, the newspapers and the dealers.

"Salvage scrap is much more difficult for dealers to prepare than the ordinary run of material. Because of its nature practically every piece must be sorted separately. Although confronted with a manpower problem, dealers have been pressed by the government to handle this material rapidly. They have no choice in the material coming to their yards.

"Although more industrial and general scrap is coming out and the flow of preferred grades has increased, it is not yet safe for the mills to assume that they are out of the woods so far as the supply of scrap is concerned. Cold weather which handicaps transportation and scrap yard operations can transform a long position to a short one speedily.

"Some dealers have lost up to \$300 per car by the rejection of materials which the mills were hungry for a month ago. Some of these losses have been sustained by small yards now being operated by the mothers of sons called to the service. These yards will have to be closed unless the mills reverse their policy.

"The disillusionment of the public which followed the aluminum, waste paper and rubber drives is now threatened in salvage."

Mr. Barringer made public a

statement to Albert Pleydell, commissioner of purchases for New York City, asserting that salvage drive scrap from the metropolitan area was being given a run-around by some Eastern Pennsylvania mills and disclosing that the WPB had taken cognizance of the plight of dealers by allocating some of this material to steel mills in the Youngstown and Western Pennsylvania districts.

At New York Mayor LaGuardia turned the city's household scrap drive piles over to Metals Reserve Co. last Saturday, for \$1 and a promise of any profits. Movement of the scrap will be administered by WPB, which hopes to get it into war production at a faster pace. In the last six weeks, about 10,000 tons, a little less than a third, has been bought and processed by nine dealers in the metropolitan area.

On Monday, this week, the WPB met with dealers and gave them a pep talk, but so far no concrete plans have been revealed for speeding the scrap through the yards, which dealers say are already taxed to the limit, or for persuading mills to halt rejections and resume taking household scrap, which they have lately refused in favor of better supplies of industrial scrap. Apparently no change in the dealers' buying price is contemplated.

Consumption at Peak; Stocks Show Increase

• • • All records for the consumption of scrap were broken in October, according to the Institute of Scrap Iron and Steel, Inc., which estimated October use at 4,883,000 gross tons, compared with 4,556,000 in September.

Domestic stocks of iron and steel scrap at consumer, supplier and producer plants at the end of September approximated 5,545,000 gross tons, an increase of 5 per cent over the tonnage on Aug. 31, according to the Bureau of Mines.

PITTSBURGH — Material coming here represents for the most part allocations, many of them from the East. This district as in the past still produces only about half of actual requirements. During peacetimes, the scrap was enticed here by higher prices, but with ceiling prices now in effect, it is necessary to allocate scrap here, otherwise local producers would not have enough.

ST. LOUIS — The complaint of steel mills now is that they are getting too much.

(CONTINUED ON PAGE 144)

LEE Quality Springs

ALL SHAPES • ALL SIZES • ALL MATERIALS



LEE SPRING COMPANY, Inc.

30 MAIN STREET

BROOKLYN, N.Y.

LEE BUILT
TRADE
MARK
SPRINGS

SCRAP PRICES

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES

(All Prices Are Per Gross Ton)																						
BASIC OPEN HEARTH GRADES				BLAST FURNACE GRADES				Low Phos.				Heavy Structural and Plate				Cut Auto Steel Scrap						
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton.....	\$20.00	\$16.00	\$16.00	No. 1 Heavy Melting: No. 1 Hydr. Com- pressed Black Sheets, No. 2 Heavy Melting; Dealers' No. 1 Bundles; Dealers' No. 2 Bundles; No. 1 Busheling)	Unbaled* Machine Shop Turnings	(Mixed Borings and Turnings; Shoveling Busheling; Cast Iron Borings)	Turnings; No. 2 Busheling; Cast Iron Borings)	No. 2 Busheling	Billet, Bloom, Forge Crops	25.00 22.50	\$21.00 \$21.50	\$22.00	\$20.00 \$20.50	\$21.00	\$18.00 \$19.50	\$21.00	\$18.00 \$19.50	\$21.00	\$18.00 \$19.50	\$21.00	\$18.00 \$19.50	\$21.00
Cleveland, Middletown, Cincinnati, Portsmouth Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Pt.....	19.50	15.50	15.50	17.00	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50	17.50	19.00	20.50	17.50	19.00	20.50	
Ashland, Ky.....	19.50	15.50	15.50	17.00	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50	17.50	19.00	20.50	17.50	19.00	20.50	
Buffalo, N. Y.....	19.25	15.25	15.25	16.75	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25	17.25	18.75	20.25	17.25	18.75	20.25	
Bethlehem, Pa.; Kokomo, Ind.....	18.25	14.25	14.25	15.75	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25	16.25	17.75	19.25	16.25	17.75	19.25	
Duluth, Minn.....	18.00	14.00	14.00	15.50	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00	16.00	17.50	19.00	16.00	17.50	19.00	
Detroit, Mich.....	17.85	13.85	13.85	15.35	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85	15.85	17.35	18.85	15.85	17.35	18.85	
Toledo, Ohio.....	17.50	13.50	13.50	15.00	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50	15.50	17.00	18.50	15.50	17.00	18.50	
St. Louis, Mo.....	17.50	13.50	13.50	15.00	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50	15.50	17.00	18.50	15.50	17.00	18.50	
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburgh, Cal.; San Francisco Innequa, Colo.....	17.00	13.00	13.00	14.50	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00	15.00	16.50	18.00	15.00	16.50	18.00	
Seattle, Wash.....	16.50	12.50	12.50	14.00	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50	14.50	16.00	17.50	14.50	16.00	17.50	
	14.50	10.50	10.50	12.00	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50	12.50	14.00	15.50	12.50	14.00	15.50	

*Baled turnings are \$4 per gross ton higher. Dealers may charge \$2 per ton for crushing other than heavy turnings. An industrial producer may charge \$1.

BUNDLES: Tin can bundles are \$4 below dealers' No. 2 bundles; No. 3 bundles are \$2 less than No. 1 heavy melting.

AT NEW YORK city or Brooklyn, the maximum shipping point price is \$15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is \$15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of \$6.65 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 50c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Clayton, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburgh, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, cut auto scrap and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

MAXIMUM prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad car or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation

charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be \$2.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made \$4) less the maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge \$2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

Maximum price of all scrap in a vehicle is that of the lowest price grade in the shipment. This limitation does not apply to vessel shipments if grades are segregated.

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed. For special preparation charges, consult official order.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), \$1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), \$2 less than No. 1 heavy melting. If loaded in box cars add 75c.

UNPREPARED CAST IRON SCRAP—Except for heavy breakable cast, unprepared scrap is given a price ceiling of \$2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their plants. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA.

*At Memphis 50c.; Great Lakes ports \$1; New England \$1.25.

RAILROAD SCRAP							CAST IRON SCRAP							Group A							Group B			Group C			
Scrap Rails				No. 1 RR Heavy Melting			Rails for Rerolling			3 ft. and Under			2 ft. and Under			18 in. and Under			Group A			Group B			Group C		
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown.....	\$20.50	\$21.50	\$23.00	\$23.50	\$23.75	\$24.00	24.00	24.25	24.50	21.50	21.25	21.50	22.50	23.25	23.50	23.75	24.00	24.25	24.50	\$18.00	\$19.00	\$20.00	\$18.00	\$19.00	\$20.00		
Canton, Pittsburgh Sharon, Steubenville, Wheeling, Youngstown.....	21.00	22.00	23.50	24.00	24.25	24.50	22.75	23.00	23.25	21.00	21.25	21.50	22.00	22.25	22.50	22.75	23.00	23.25	23.50	18.00	19.00	20.00	18.00	19.00	20.00		
Chicago, Philadelphia, Sparrows Pt., Wilmington, San Francisco.....	19.75	20.75	22.25	22.75	23.00	23.25	20.50	21.00	21.25	19.00	19.25	19.50	19.50	19.75	20.00	20.25	20.50	20.75	21.00	17.50	18.50	19.50	17.50	18.50	19.50		
Buffalo.....	20.25	21.25	22.75	23.25	23.50	23.75	20.50	21.00	21.25	19.00	19.25	19.50	19.50	19.75	20.00	20.25	20.50	20.75	21.00	17.50	18.50	19.50	17.50	18.50	19.50		
Detroit.....	18.85	19.85	21.35	21.85	22.10	22.35	19.00	19.50	19.75	17.00	17.25	17.50	17.50	17.75	18.00	18.25	18.50	18.75	19.00	17.00	18.00	19.00	17.00	18.00	19.00		
Duluth.....	19.00	20.00	21.50	22.00	22.25	22.50	19.50	20.00	20.25	17.00	17.25	17.50	17.50	17.75	18.00	18.25	18.50	18.75	19.00	15.50	16.50	17.50	15.50	16.50	17.50		
Kansas City, Mo.....	17.00	18.00	19.50	20.00	20.25	20.50	17.50	18.00	18.25	15.00	15.25	15.50	15.50	15.75	16.00	16.25	16.50	16.75	17.00	12.00	13.00	14.00	12.00	13.00	14.00		
Kokomo, Ind.....	19.25	20.25	21.75	22.25	22.50	22.75	19.50	20.00	20.25	17.00	17.25	17.50	17.50	17.75	18.00	18.25	18.50	18.75	19.00	16.00	17.00	18.00	16.00	17.00	18.00		
Seattle.....	15.50	16.50	18.00	18.50	18.75	19.00	15.00	15.50	15.75	12.50	12.75	13.00	13.00	13.25	13.50	13.75	14.00	14.25	14.50	10.00	11.00	12.00	10.00	11.00	12.00		
St. Louis.....	18.50	19.50	21.00	21.50	21.75	22.00	19.00	19.50	19.75	16.50	16.75	17.00	17.00	17.25	17.50	17.75	18.00	18.25	18.50	15.00	16.00	17.00	15.00	16.00	17.00		

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.
 Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.
 Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

. . . Composite Prices

Advances Over Past Week in Heavy Type; Declines in *Italics*. (Prices Are F.O.B. Major Basing Points)

Flat Rolled Steel: (Cents Per Lb.)	Dec. 1, 1942	Nov. 24, 1942	Nov. 2, 1942	Dec. 2, 1941
Hot rolled sheets.....	2.10	2.10	2.10	2.10
Cold rolled sheets.....	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip.....	2.10	2.10	2.10	2.10
Cold rolled strip.....	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terne Plate:
(Dollars Per Base Box)

Tin plate, standard cokes	\$5.00	\$5.00	\$5.00	\$5.00
Tin plate, electrolytic.....	4.50	4.50	4.50	4.50
Special coated mfg. terne	4.30	4.30	4.30	4.30

Bars and Shapes:
(Cents Per Lb.)

Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars.....	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars.....	4.40	4.40	4.40	4.40

Wire and Wire Products:
(Cents Per Lb.)

Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55

Rails:

(Dollars Per Gross Ton)				
Heavy rails	\$40.00	\$40.00	\$40.00	\$40.00
Light rails	40.00	40.00	40.00	40.00

Semi-Finished Steel:
(Dollars Per Gross Ton) ..

Rerolling billets	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp:
(Cents Per Lb.)

Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 157 to 162 herein.

Pig Iron:	Dec. 1, 1942	Nov. 24, 1942	Nov. 2, 1942	Dec. 2, 1941
(Per Gross Ton)	1942	1942	1942	1941
No. 2 fdy., Philadelphia	\$25.89	\$25.89	\$25.89	\$25.84
No. 2, Valley furnace...	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti...	24.68	24.68	24.68	24.06
No. 2, Birmingham.....	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa...	25.39	25.39	25.39	25.34
Basic, Valley furnace...	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago..	31.34	31.34	31.34	31.34
Ferromanganese‡	135.00	135.00	135.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

‡For carlots at seaboard.

Scrap:	Dec. 1, 1942	Nov. 24, 1942	Nov. 2, 1942	Dec. 2, 1941
(Per Gross Ton)	1942	1942	1942	1941
Heavy melting steel, P'gh.	\$20.00	\$20.00	\$20.00	\$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Young'sn	22.50	22.50	22.50	23.00
No. 1 cast, Pittsburgh...	20.00	20.00	20.00	22.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	24.00
No. 1 cast, Ch'go.....	20.00	20.00	20.00	20.00

Coke, Connellsville:	Dec. 1, 1942	Nov. 24, 1942	Nov. 2, 1942	Dec. 2, 1941
(Per Net Ton at Oven)	1942	1942	1942	1941
Furnace coke, prompt...	\$6.00	\$6.00	\$6.00	\$6.125
Foundry coke, prompt...	6.875	6.875	6.875	6.875

Non-Ferrous Metals:	Dec. 1, 1942	Nov. 24, 1942	Nov. 2, 1942	Dec. 2, 1941
(Cents per Lb. to Large Buyers)	1942	1942	1942	1941
Copper, electro., Conn...	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis.....	8.25	8.25	8.25	8.25
Lead, St. Louis.....	6.35	6.35	6.35	5.70
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

FINISHED STEEL

Dec. 1, 1942	2.30467c.	2.30467c.		
One week ago.....	2.30467c.	2.30467c.		
One month ago.....	2.30467c.	2.30467c.		
One year ago.....	2.30467c.	2.30467c.		

PIG IRON

Dec. 1, 1942	23.61	a Gross Ton.....		
One week ago.....	23.61	a Gross Ton.....		
One month ago.....	23.61	a Gross Ton.....		
One year ago.....	23.61	a Gross Ton.....		

Dec. 1, 1942	\$19.17	a Gross Ton.....		
One week ago.....	\$19.17	a Gross Ton.....		
One month ago.....	\$19.17	a Gross Ton.....		
One year ago.....	\$19.17	a Gross Ton.....		

SCRAP STEEL

Dec. 1, 1942	\$19.17	\$19.17		
One week ago.....	\$19.17	\$19.17		
One month ago.....	\$19.17	\$19.17		
One year ago.....	\$19.17	\$19.17		

HIGH LOW

1942.....	2.30467c.	2.30467c.		
1941.....	2.30467c.	2.30467c.		
1940.....	2.30467c., Jan. 2	2.24107c., Apr. 16		
1939.....	2.35367c., Jan. 3	2.26689c., May 16		
1938.....	2.58414c., Jan. 4	2.27207c., Oct. 18		
1937.....	2.58414c., Mar. 9	2.32263c., Jan. 4		
1936.....	2.32263c., Dec. 28	2.05200c., Mar. 10		
1935.....	2.07642c., Oct. 1	2.06492c., Jan. 8		
1934.....	2.15367c., Apr. 24	1.95757c., Jan. 2		
1933.....	1.95578c., Oct. 3	1.75836c., May 2		
1932.....	1.89196c., July 5	1.83901c., Mar. 1		
1931.....	1.99629c., Jan. 13	1.86586c., Dec. 29		
1930.....	2.25488c., Jan. 7	1.97319c., Dec. 9		
1929.....	2.31773c., May 28	2.26498c., Oct. 29		

1942.....	\$23.61	\$23.61		
1941.....	23.45	22.61	Jan. 2	
1940.....	22.61	20.61	Sept. 12	
1939.....	23.25	19.61	July 6	
1938.....	23.25	20.25	Feb. 16	
1937.....	19.74	18.73	Aug. 11	
1936.....	18.84	17.		

Prices of Finished Iron and Steel...

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition.

Basing Point ↓ Product	10												DELIVERED TO		
	Pitts- burgh	Chi- cago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Philadel- phia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.22¢	2.35¢	2.28¢
Cold rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.17¢	3.41¢	3.39¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.75¢	3.68¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.47¢	3.73¢	3.69¢
Long ternes ²	3.80¢		3.80¢									4.55¢		4.18¢	4.14¢
STRIP															
Hot rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.22¢	2.48¢	
Cold rolled ⁴	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.92¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.58¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.07¢	3.33¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	\$5.00	\$5.00	\$5.00						\$5.10					5.38¢	5.34¢
Electrolytic tin plate, box	\$4.50		\$4.50												
Black plate, 20 gage ⁵	3.05¢	3.05¢	3.05¢					3.15¢			4.05¢ ¹²				3.39¢
Mfg. ternes, special box	\$4.30	\$4.30	\$4.30					\$4.40							
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				(Duluth = 2.25¢)	2.52¢	2.80¢	2.27¢	2.51¢	2.49¢
Rail steel ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.52¢	2.80¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.52¢	2.55¢ ¹³	2.27¢	2.40¢	
Reinforcing (rail) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.52¢	2.55¢ ¹³	2.27¢		2.49¢
Cold finished ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢				(Detroit = 2.70¢)				3.01¢	2.99¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢				Bethlehem, Massillon, Canton = 2.70¢)			2.82¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.47¢		
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢ ¹¹		2.47¢	2.65¢	2.33¢	2.30¢	2.155¢
Floor plates	3.35¢	3.35¢									3.72¢	4.00¢		3.73¢	3.69¢
Alloy	3.50¢	3.50¢				(Coatesville = 3.50¢)					3.97¢	4.15¢		3.71¢	3.60¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢				(Bethlehem = 2.10¢)	2.47¢	2.75¢		2.28¢	2.22¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢						(Worcester = 3.00¢)					
0.51 to 0.75 Carbon	4.30¢			4.30¢						(Worcester = 4.50¢)					
0.76 to 1.00 Carbon	6.15¢			6.15¢						(Worcester = 6.35¢)					
1.01 to 1.25 Carbon	8.35¢			8.35¢						(Worcester = 8.55¢)					
WIRE⁹															
Bright ¹⁰	2.60¢	2.60¢		2.60¢	2.60¢					(Worcester = 2.70¢)			3.10¢		2.94¢
Galvanized															
Spring (High Carbon)	3.20¢	3.20¢		3.20¢						(Worcester = 3.30¢)			3.70¢		3.54¢
PILING															
Steel sheet	2.40¢	2.40¢					2.40¢					2.95¢			2.74¢

¹ Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. ² Unassorted 8-lb. coating. ³ Widths up to 12 in. ⁴ Carbon 0.25 per cent and less. ⁵ Applies to certain widths and length limitations. ⁶ For merchant trade. ⁷ Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. ⁸ Also shafting. For quantities of 20,000 to 39,999 lb. ⁹ Carload lot to manufacturing trade. ¹⁰ These prices do not apply if the customary means of transportation (rail and water) are not used. ¹¹ Ship plates only. ¹² Boxed. ¹³ Portland and Seattle price, San Francisco price is 2.50c. ¹⁴ This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILINGS—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices, which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE NO. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points; Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.33c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.30c. f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export. On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at \$49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at \$34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at \$34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at \$50 at established basing points and slabs at \$41; Empire Sheet and Tin Plate may sell slabs at \$41 at established basing points and sheet bars at \$39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge \$41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge \$36 per ton for small billets, f.o.b. Portsmouth and \$37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

DIE CAST INFLATOR FOR LIFE BELTS



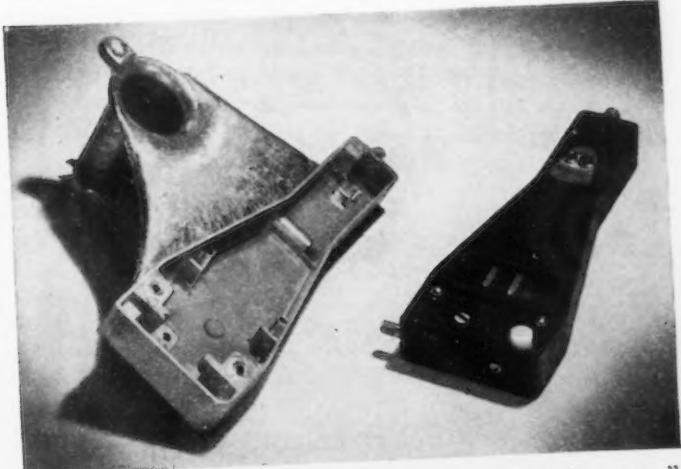
Note the complex design of these ZINC Alloy Die Castings.

The life belt shown at the right of the above illustration is issued to every man on Navy transports. To automatically inflate this belt to the proper pressure, it is only necessary to squeeze it with the left hand, which action punctures the two carbon dioxide gas cartridges in the ZINC Alloy Die Casting labeled "U.S.N." (left).

The die casting process provides an efficient means of production for the cartridge holder, as well as for the caps for the two compartments.

FOR RAPID TOLERANCE INSPECTION

Herewith another example of a high speed inspection method assisting high speed war production. The "Micro-Chek" device, illustrated below, speeds up the job of checking the tolerance range of duplicate parts against a standard. The two limit markers shown on the dial are set to permissible tolerance limits and the part under inspection is then "miked" by



This also can be used as a snap gage by adjusting the "hold-down screw" near the button.

THE
New Jersey
Zinc



ALLOY POT

A publication issued for many years by THE NEW JERSEY ZINC COMPANY to report on trends and accomplishments in the field of die castings. Title Reg. U. S. Pat. Off.

IRON AGE EDITION

No. 4

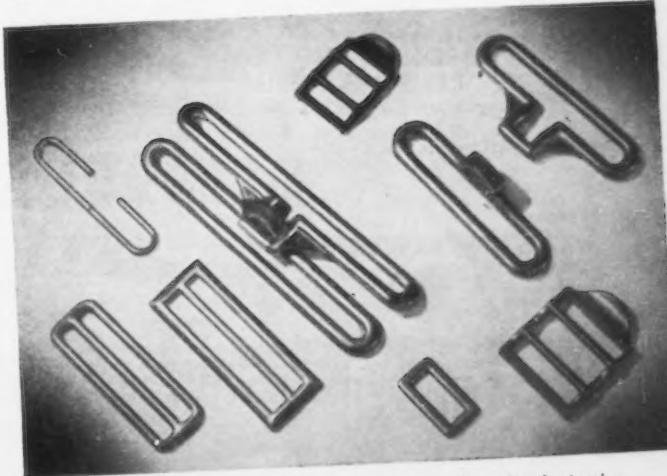
pressing a button (lower right) which moves the gaging plunger (at the left side of the "Micro-Chek") against the part, and causes an indicator finger to move across the dial. If the finger stops between the two limit markers the tolerances of the part are acceptable.

The housing base for this device is a one-piece ZINC Alloy Die Casting, shown attached to the sprue as it came from the die casting machine. All of the mounting elements are integrally cast, and the housing has a smooth as-cast surface which is easily finished in a durable olive-drab wrinkle lacquer.

ZINC ALLOY DIE CASTINGS AID ARMY Q. M. CORPS

The search for substitute materials often ends in the adoption of one which is so well suited to the application that one wonders why it was not used in the first place.

The U. S. Army Quartermaster Corps, for example, is now using ZINC Alloy Die Cast hardware for belts, haversacks, etc. This metal and method of production relieve other more critical materials and overburdened manufacturing facilities. And the parts produced (below) are clean cut, smooth-surfaced, strong—and are turned out at high speed. Thus a highly satisfactory and economical method of producing personal hardware has been developed.



ZINC Alloy Die Castings find a new niche—through substitution.

THE NEW JERSEY ZINC COMPANY

HORSE HEAD SPECIAL

160 FRONT ST., NEW YORK CITY
99.99 + %
(Uniform Quality) **ZINC**

PRICES

SEMI-FINISHED STEEL

For exceptions, see preceding page

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are \$2.25 higher; f.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton

Rerolling \$34.00
Forging quality 40.00

Alloy Steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton \$54.00

Shell Steel

Per Gross Ton

3 in. to 12 in. \$52.00
12 in. to 18 in. 54.00
18 in. and over 56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham. Prices delivered Detroit are \$2.25 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open hearth or bessemer \$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared 1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Lb.

Pittsburgh, Chicago, Cleveland 2.00c.

Worcester, Mass. 2.10c.

Birmingham 2.00c.

San Francisco 2.50c.

Galveston 2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. heavier. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

Base per lb.

High speed 67c.

Straight molybdenum 54c.

Tungsten-molybdenum 57½c.

High-carbon-chromium 43c.

Oil hardening 24c.

Special carbon 22c.

Extra carbon 18c.

Regular carbon 14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi, 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	35.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

NATIONAL EMERGENCY STEELS (Hot Rolled)

Extras for Alloy Content

Designa-tion	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phos-phorus Max.	Sul-phur Max.	Silicon	Chrom-ium	Nickel	Molyb-denum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/.33	1.60/1.90	.040	.040	.20/.35				.10c	\$2.00		
NE 1335	.33/.38	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1340	.38/.43	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1345	.43/.48	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1350	.48/.53	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 8020	.18/.23	1.00/1.30	.040	.040	.20/.35				.10/.20	.45	9.00	.95c \$19.00
NE 8022	.20/.25	1.00/1.30	.040	.040	.20/.35				.10/.20	.45	9.00	.95 19.00
NE 8339	.37/.42	1.30/1.60	.040	.040	.20/.35				.20/.30	.75	15.00	1.25 25.00
NE 8442*	.40/.45	1.30/1.60	.040	.040	.20/.35				.30/.40	.90	18.00	1.40 28.00
NE 8613	.12/.17	.70/.90	.040	.040	.20/.35	.40/.60	.40/.60	.15/.25	.75	15.00	1.25 25.00	
NE 8616	.13/.18	.70/.90	.040	.040	.20/.35	.40/.60	.40/.60	.15/.25	.75	15.00	1.25 25.00	
NE 8617	.15/.20	.70/.90	.040	.040	.20/.35	.40/.60	.40/.60	.15/.25	.75	15.00	1.25 25.00	
NE 8620	.18/.23	.70/.90	.040	.040	.20/.35	.40/.60	.40/.60	.15/.25	.75	15.00	1.25 25.00	
NE 8630	.28/.33	.70/.90	.040	.040	.20/.35	.40/.60	.40/.60	.15/.25	.75	15.00	1.25 25.00	
NE 8720	.18/.23	.70/.90	.040	.040	.20/.35	.40/.60	.40/.60	.20/.30	.80	16.00	1.30 26.00	
NE 8722	.20/.25	.70/.90	.040	.040	.20/.35	.40/.60	.40/.60	.20/.30	.80	16.00	1.30 26.00	
NE 8735	.33/.38	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.60	.20/.30	.80	16.00	1.30 26.00	
NE 8739	.35/.40	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.60	.20/.30	.80	16.00	1.30 26.00	
NE 8740	.38/.43	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.60	.20/.30	.80	16.00	1.30 26.00	
NE 8744	.40/.45	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.60	.20/.30	.80	16.00	1.30 26.00	
NE 8749	.45/.50	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.60	.20/.30	.80	16.00	1.30 26.00	
NE 8949*	.45/.50	1.00/1.30	.040	.040	.20/.35	.40/.60	.40/.60	.30/.40	1.20	24.00	1.70 34.00	
NE 9255	.50/.60	.70/.95	.040	.040	1.80/2.20				.40c	8.00		
NE 9260	.55/.65	.75/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9262	.55/.65	.75/1.00	.040	.040	1.80/2.20				.65	13.00		
NE 9415	.13/.18	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.40	.08/.15	.80	16.00	1.30c \$26.00	
NE 9420	.18/.23	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.40	.08/.15	.80	16.00	1.30 26.00	
NE 9422	.20/.25	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.40	.08/.15	.80	16.00	1.30 26.00	
NE 9430	.28/.33	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.40	.08/.15	.80	16.00	1.30 26.00	
NE 9435	.33/.38	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.40	.08/.15	.80	16.00	1.30 26.00	
NE 9437	.35/.40	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.40	.08/.15	.80	16.00	1.30 26.00	
NE 9440	.38/.43	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.40	.08/.15	.80	16.00	1.30 26.00	
NE 9442	.40/.45	1.00/1.30	.040	.040	.40/.60	.20/.40	.20/.40	.08/.15	.85	17.00	1.35 27.00	
NE 9445	.43/.48	1.00/1.30	.040	.040	.40/.60	.20/.40	.20/.40	.08/.15	.85	17.00	1.35 27.00	
NE 9450	.48/.53	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.40	.08/.15	.85	17.00	1.35 27.00	
NE 9537*	.35/.40	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.40	.15/.25	1.20	24.00	1.70 34.00	
NE 9540*	.38/.43	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.40	.15/.25	1.20	24.00	1.70 34.00	
NE 9542*	.40/.45	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.40	.15/.25	1.20	24.00	1.70 34.00	
NE 9550*	.48/.53	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.40	.15/.25	1.20	24.00	1.70 34.00	
NE 9630	.28/.33	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.40		.80	16.00	1.30 26.00	
NE 9635	.33/.38	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.40		.80	16.00	1.30 26.00	
NE 9637	.35/.40	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.40		.80	16.00	1.30 26.00	
NE 9640	.38/.43	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.40		.80	16.00	1.30 26.00	
NE 9642	.40/.45	1.30/1.60	.040	.040	.40/.60	.20/.40	.20/.40		.85	17.00	1.35 27.00	
NE 9645	.43/.48	1.30/1.60	.040	.040	.40/.60	.20/.40	.20/.40		.85	17.00	1.35 27.00	
NE 9650	.48/.53	1.30/1.60	.040	.040	.40/.60	.20/.40	.20/.40		.85	17.00	1.35 27.00	

*Recommended for large sections only.

Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and \$54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh) Per Lb.

Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c



PLEDGE SAFETY FOR TODAY AND FOR '43!

PRODUCTION OF POWER SAWS DOUBLED . . . WITHOUT A LOST TIME ACCIDENT*

One sure way to speed up deliveries to our fighting men is to make all first cuts of the metal the SAFE, ECONOMICAL way. Peerless Power Saws are replacing much of the "chunking-off" equipment—considered good enough in the era when metal was plentiful and manpower still unrestricted. The Peerless cool-running, straight-cutting blade, held firmly in the Four-Sided Saw-Frame, removes as little as $1/16$ " of the metal. Automatic types are quickly loaded by crane-power. On a single setup of small parts, cutting may progress

for several hours without attention. Sawing is a safe operation from the first cut to the finish.

Dozens of America's major suppliers of war materials already are beating schedules by cutting all their metal the high speed, accurate Peerless way.

At this year's end is a good time to renew your production and safety pledges for '43. Literature free for the asking — test samples cut on request.

PEERLESS MACHINE COMPANY • Racine, Wis.

PEERLESS MACHINE COMPANY, Dept. IA-1242, Racine, Wisconsin

Mail information on Peerless Saws. We are interested in stepping up production with greater safety.

- Mail catalog on Hydraulic type Saw for High Production Cutting
- Mail catalog covering Vertical type used for Die Block Work
- Mail catalog on Mechanical type Saw for production cutting
- Mail catalog on general utility and maintenance Saws

Company.....

Individual.....

Street.....

City.....

State.....

Peerless
METAL SAWING MACHINES

FAST, ACCURATE CUTTING DEMANDS POSITIVE BLADE CONTROL

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent off List
1/2 in. & smaller x 6 in. & shorter	65 1/2
9/16 & 5/8 in. x 6 in. & shorter	63 1/2
3/4 to 1 in. x 6 in. & shorter	61
1 1/4 in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:

	(Hexagon or Square)
1/2 in. and smaller	62
9/16 to 1 in. inclusive	59
1 1/4 to 1 1/2 in. inclusive	57
1 1/2 in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts U.S.S. S.A.E.

	7/16 in. and smaller	64
1/2 in. and smaller	62	..
1/2 in. through 1 in.	60	..
9/16 to 1 in.	59	..
1 1/4 in. through 1 1/2 in.	57	58
1 1/2 in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose..... 71 and 10
In packages, with nuts attached..... 71

In bulk..... 80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets (1/2 in. and larger)

Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham..... \$3.75

Small Rivets (7/16 in. and smaller)

Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham..... 65 and 5

Cap and Set Screws Per Cent Off List

	Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71	..
Milled studs	46	..
Flat head cap screws, listed sizes	36	..
Fillister head cap, listed sizes	51	..

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

WAREHOUSE PRICES

(Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 49)

CITIES	SHEETS			STRIP		Plates (1/4 in. and heavier)	Structural Shapes	BARS			ALLOY BARS		
	Hot Rolled (10 ga.)	Cold Rolled	Galv. (24 ga.)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled 2300	Hot Rolled 3100	Cold Drawn 2300	Cold Drawn 3100
Pittsburgh.....	\$3.35		\$4.65	\$3.60	\$3.20	\$3.40	\$3.40	\$3.35	\$3.65	\$7.45	\$5.75	\$8.40	\$8.75
Chicago.....	3.25	\$4.10	4.85 ¹	3.60	3.50	3.55	3.55	3.50	3.75	7.35	5.65	8.40	6.75
Cleveland.....	3.35	4.05	4.62	3.50	3.20	3.40	3.58	3.25	3.75	7.55	5.85	8.40	6.75
Philadelphia.....	3.55	4.05 ⁵	4.65	3.51	3.31	3.55	3.55	3.85	4.06	7.31	5.86	8.56	7.18
New York.....	3.58	4.60 ²	5.00	3.96 ⁶	3.51	3.76	3.75	3.84	4.09	7.60	5.90	8.84	7.19
Detroit.....	3.43	4.30	4.84 ¹	3.68*	3.40	3.60	3.65	3.43	3.80	7.67	5.97	8.70	7.05
Buffalo.....	3.25	4.30 ¹	4.75 ⁴	3.82	3.52	3.62	3.40	3.35	3.75	7.35	5.65	8.40	6.75
Boston.....	3.71	4.68	5.11	4.06	3.46	3.85	3.85	3.98	4.13	7.77	6.07	8.91	7.26
Birmingham.....	3.45 ³		4.75 ¹	3.70 ³		3.55 ³	3.55 ³	3.50 ³	4.48				
St. Louis.....	3.39	4.24 ²	4.99 ¹	3.74	3.61	3.69	3.69	3.64	4.02	7.72	6.02	8.77	7.12
St. Paul.....	3.50	4.35	5.00	3.85	3.83	3.80	3.80	3.75	4.34	7.45	6.00	8.84	7.44
Milwaukee.....	3.38	4.23 ²	4.98 ¹	3.73	3.54	3.68	3.68	3.63	3.88	7.58	5.88	8.63	6.98
Baltimore.....	3.50		5.05	4.00		3.70	3.70	3.85	4.04				
Cincinnati.....	3.42	4.37 ²	4.42 ¹	3.67	3.45	3.65	3.68	3.60	4.00	7.69	5.99	8.50	7.10
Norfolk.....	3.85		5.40	4.10		4.05	4.05	4.00	4.15				
Washington.....	3.60		4.10			3.80	3.80	3.95	4.10				
Indianapolis.....	3.45	4.25	5.01 ¹	3.75	3.28	3.70	3.70	3.60	3.97	7.67	5.97	8.72	7.07
Omaha.....	3.85		5.52 ¹	4.20		4.15	4.15	4.10	4.42				
Memphis.....	3.85		5.25	4.10		3.95	3.95	3.90	4.31				
New Orleans.....	4.05			4.30		3.90	3.90	4.10	4.60				
Houston.....	4.00			4.30		4.05	4.05	3.75					
Los Angeles.....	4.95	7.15	5.95	4.90		4.90	4.60	4.35	6.60	9.55	8.55	10.55	9.55
San Francisco.....	4.55	7.05	6.10	4.50		4.65	4.35	3.95	6.80	9.80	8.80	10.80	9.80
Seattle.....	4.65 ⁷		5.70 ⁷	4.25		4.75	4.45	4.20	5.75		8.00		

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: ¹ 500 to 1499 lb. ² 400 to 1499 lb. ³ 400 to 3999 lb. ⁴ 450 to 1499 lb. ⁵ 1000 to 1999 lb. ⁶ 0 to 1999 lb. ⁷ 300 to 10,000 lb. At Philadelphia galvanized sheets, 25 or more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb., galvanized and cold rolled sheets, 750 to 4999 lb., cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.; Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb., galvanized sheets, 150 and over; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lb.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations. * 12 gage and heavier, \$3.43. † Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston†.....	\$25.53	\$25.03	\$26.53	\$26.03		
Brooklyn.....	27.65				28.15	
Jersey City.....	26.62	26.12	27.62	27.12		
Philadelphia.....	25.89	25.39	26.89	26.39		
Bethlehem, Pa.....	\$25.00	\$24.50	\$26.00	\$25.50		
Everett, Mass.†.....	25.00	24.50	26.00	25.50		
Swedeland, Pa.....	25.00	24.50	26.00	25.50		
Steelton, Pa.....	24.50	24.50	26.00	25.50		
Birdsboro, Pa.....	25.00	24.50	26.00	25.50		
Sparrows Point, Md.....	25.00	24.50	26.00	25.50		
Erie, Pa.....	24.00	23.50	25.00	24.50		
Neville Island, Pa.....	24.00	23.50	24.50	24.00		
Sharpsville, Pa.*.....	24.00	23.50	24.50	24.00		
Buffalo.....	24.00	23.00	25.00	24.50		
Cincinnati.....	24.68	24.68			25.18	
Canton, Ohio.....	25.47	24.97	25.97	25.47		
Mansfield, Ohio.....	26.06	25.56	26.56	26.06		
St. Louis.....	24.50	24.00				
Chicago.....	24.00	23.50	24.50	24.00		
Granite City, Ill.....	24.00	23.50	24.50	24.00		
Cleveland.....	24.00	23.50	24.50	24.00		
Hamilton, Ohio.....	24.00	23.50	24.50	24.00		
Toledo.....	24.00	23.50	24.50	24.00		
Youngstown*.....	24.00	23.50	24.50	24.00		
Detroit.....	24.00	23.50	24.50	24.00		
Lake Superior fc.....						
Lyles, Tenn. fc.†.....	26.76				26.76	
St. Paul.....	26.76					
Duluth.....	24.50	25.00	24.50			
Birmingham.....	20.38	19.00	25.00			
Los Angeles.....	27.25					
San Francisco.....	27.25					
Seattle.....	27.25					
Provo, Utah.....	22.00					
Montreal.....	27.50	27.50			28.00	
Toronto.....	25.50	25.50			26.00	

GRAY FORGE IRON: Valley or Pittsburgh furnace..... \$23.50

* Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

** Pittsburgh Ferromanganese Co. (Chester furnace only) may charge \$2.25 a ton over maximum basing point prices.

† Price shown is for low-phosphorous iron; high-phosphorous sells for \$28.50 at the furnace.

†† Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at \$1 per gross ton above maximum prices.

Delta Chemical & Iron Co., Chicago, may charge \$30 for charcoal iron at its Delta, Mich., furnace.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

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COLORADO: Denver	GEORGIA: Albany, Atlanta, Savannah	KANSAS: Wichita	MICHIGAN: Detroit	NEW JERSEY: Trenton	Winston-Salem	Pittsburgh	VIRGINIA: Danville, Richmond
CONNECTICUT: Hartford	IDAHO: Boise	KENTUCKY: Harlan, Hazard, Louisville	KENTUCKY: Jackson	NEW YORK: Albany, Buffalo, Middletown, New York, Plattsburgh, Rochester, Syracuse	Fargo	Pittston	WASHINGTON: Seattle, Spokane
ILLINOIS: Chicago, Decatur, Peoria, Quincy	LOUISIANA: Lafayette, New Orleans, Shreveport	MISSISSIPPI: Jackson	MISSOURI: Joplin, Kansas City, St. Louis	OKLAHOMA: Oklahoma City	Minot	Reading	WEST VIRGINIA: Bluefield, Clarksburg, Huntington
				OREGON: Portland	Youngstown	Williamsport	WISCONSIN: Milwaukee
				PENNSYLVANIA: Erie	TEXAS: Dallas, El Paso, Fort Worth, Houston		WYOMING: Casper

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PRICES

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes Minimum Wall

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

	Lap	Seamless	Weld,	Cold	Hot	Hot	Drawn	Rolled	Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38						
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58						
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35						
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15						
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66						

(Extras for less carload quantities)		Base
40,000 lb. or ft. over		5%
20,000 lb. or ft. to 39,999 lb. or ft.		10%
10,000 lb. or ft. to 19,999 lb. or ft.		20%
5,000 lb. or ft. to 9,999 lb. or ft.		30%
2,000 lb. or ft. to 4,999 lb. or ft.		45%
Under 2,000 lb. or ft.		65%

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	\$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago. \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
(F.o.b. Pittsburgh only on wrought pipe)
Base Price—\$200 per Net Ton

Steel (Butt Weld)

	Black	Galv.
½ in.	63 ½	51
¾ in.	66 ½	55
1 to 3 in.	68 ½	57 ½

Wrought Iron (Butt Weld)

½ in.	25	3 ½
¾ in.	30	10
1 and 1 ¼ in.	34	16
1 ½ in.	38	18 ½
2 in.	37 ½	18

Steel (Lap Weld)

2 in.	61	49 ½
2 ½ and 3 in.	64	52 ½
3 ½ to 6 in.	66	54 ½

Wrought Iron (Lap Weld)

2 in.	30 ½	12
2 ½ to 3 ½ in.	31 ½	14 ½
4 in.	33 ½	18
4 ½ to 8 in.	32 ½	17

Steel (Butt, extra strong, plain ends)

	Black	Galv.
½ in.	61 ½	50 ½
¾ in.	65 ½	54 ½
1 to 3 in.	67	57

Wrought Iron (Same as Above)

½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19 ½

Steel (Lap, extra strong, plain ends)

2 in.	59	48 ½
2 ½ and 3 in.	63	52 ½
3 ½ to 6 in.	66 ½	56

Wrought Iron (Same as Above)

2 in.	33 ½	15 ½
2 ½ to 4 in.	39	22 ½
4 ½ to 6 in.	37 ½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld.

PRICES

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans, Domestic, 80%, per gross ton (carloads)	\$135.00
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Spiegeleisen

Per Gross Ton Furnace	
Domestic, 19 to 21%	\$36.00

Domestic, 26 to 28% 49.50

Ferroalloys

Silico-Manganese

(Per Gross Ton, Delivered, Carloads, Bulk)

3 carbon	\$120.00
2.50 carbon	125.00
2 carbon	130.00
1 carbon	140.00

Other Ferroalloys

Ferrotungsten, per lb. contained
W, del'd carload \$2.00

Ferrotungsten, 100 lb. and less 2.25

Ferrovanadium, contract per lb.

contained V, del'd \$2.70 to \$2.90†

Ferrocolumbium, per lb. contained

Cb, f.o.b. Niagara Falls, N. Y., ton lots

\$2.25†

Ferrocobaltitanium, 15-18 Ti,

7-8 C, f.o.b. furnace, carload

contract, net ton \$142.50

Ferrocobaltitanium, 17-20 Ti,

3-5 C, f.o.b. furnace, carload

contract, net ton \$157.50

Ferrophosphorus, electric or blast

furnace materials, carloads,

f.o.b. Anniston, Ala., for 18%,

with \$3 unitage freight, equalized

with Rockdale, Tenn., gross ton \$58.50

Ferrophosphorus, electrolytic 23-

26%, carlots, f.o.b. Monsanto

(Sieglo), Tenn., \$3 unitage,

freight equalized with Nashville,

gross ton \$75.00

Fermolybdenum, per lb., Mo,

f.o.b. furnace 95c.

Calcium molybdate, per lb. Mo,

f.o.b. furnace 80c.

Molybdenum oxide briquettes 48-

52 Mo, per lb. contained Mo,

f.o.b. Langloch, Pa. 80c.

Molybdenum oxide, in cans, per lb.

contained Mo, f.o.b. Langloch,

and Washington, Pa. 80c.

*Spot prices are 5¢ per ton higher.

†Spot prices are 10¢ per lb. of contained element higher.

Bessemer Ferrosilicon

Per Gross Ton, base 6.00 to 6.50 Si	
F.o.b. Jackson, Ohio	\$29.50*
Buffalo	30.75
For each additional 0.50% silicon add \$1 a ton. For each 0.50% manganese over 1% add 50¢ a ton. Add \$1 a ton for 0.75% phosphorus or over.	
Official OPA price established June 24, 1941.	

Per Lb., Contained Cr, Delivered Car- lots, Lump Size, on Contract	
4 to 6 carbon	13.00c.
2 carbon	19.50c.
1 carbon	20.50c.
0.10 carbon	22.50c.
0.06 carbon	23.00c.

Spot prices are ¼ c. per lb. of contained chromium higher.

COKE*

Furnace

Per Net Ton	
Connellsville, prompt	\$6.00

Foundry

Per Net Ton	
Connellsville, prompt	\$6.75 to \$7.00
By-product, Chicago	\$12.25
By-product, New England	\$13.75
By-product, Newark	\$12.40 to \$12.95
By-product, Philadelphia	\$12.38
By-product, Cleveland	\$12.30
By-product, Cincinnati	\$11.75
By-product, Birmingham	\$8.50†
By-product, St. Louis	\$12.02
By-product, Buffalo	\$12.50

*Maximum by-product coke prices established by OPA became effective Oct. 1, 1941. A complete schedule of the ceiling prices was published in THE IRON AGE, Sept. 25, p. 94B. Maximum beehive furnace coke prices established by OPA, Jan. 26. †F.O.B. oven.

Ceiling for operators of hand drawn ovens using trucked coal is \$6.50.

FLUORSPAR

Per Net Ton	
Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail	\$25.00

Domestic, f.o.b. Ohio River landing barges

No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines

25.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester

In sacks (carloads) \$44.00

Domestic, f.o.b. Chewelah, Wash.

(in bulk) 22.00

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